



AGRICULTURAL RESEARCH INSTITUTE

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ROYAL BOTANIC GARDENS, KEW

BULLETIN OF  
MISCELLANEOUS  
INFORMATION

1940

LONDON

PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE

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1941



THE SEPARATE NUMBERS OF THIS VOLUME WERE  
PUBLISHED ON THE FOLLOWING DATES:

1940.					<i>Price.</i>
No. 1	...	...	March 12	...	1s. 3 <i>d.</i> Net.
No. 2	...	...	April 4	...	9 <i>d.</i> „
No. 3	...	...	June 1	...	1s. 3 <i>d.</i> „
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No. 6	...	...	December 10	...	1s. 6 <i>d.</i> „
No. 7	...	...	February 6, 1941	...	1s. 6 <i>d.</i> „

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#### ERRATUM.

Kew Bulletin, Appendix, 1939. p. 693, line 19, for " east " read " west."

# BULLETIN OF MISCELLANEOUS INFORMATION No. 1 1940 ROYAL BOTANIC GARDENS, KEW

## I—THE STRUCTURE AND DEVELOPMENT OF SOME APOMICTS OF *TARAXACUM*. W. M. CURTIS.\*

### INTRODUCTION.

In the genus *Taraxacum* a large number of biotypes have been recorded which, when grown under similar experimental conditions, show marked morphological differences. The biotypes now studied were grown, except when used in controlled experiments, in the open in garden soil in the Herbarium Experimental Ground at Kew, the conditions of soil, moisture and light being as uniform as possible. Seedlings of the same age obtained from the seed of one plant were grown in rows; the plants in one row were very uniform but often quite distinct in habit and leaf shape from the plants in other neighbouring rows grown from seeds of different strains. While the biotypes are morphologically distinct, there may be in any one of them a considerable degree of variation influenced by factors affected by age, by the supply of food, by light and moisture. Turrill (1938) has discussed the taxonomic status of biotypes of *Taraxacum* and has drawn attention to their plasticity. The present observations and experiments on variation in the biotypes are concerned mainly with the characters of the leaves and their variation in relation to the conditions enumerated above. The origin of the material of the biotypes used is given in the appendix to this paper, where it is shown that apomixis has been proved for two of the biotypes discussed. The leaf shape characteristic of each biotype at the time of full flowering (April-May) in the plant's second growing season, is shown in Figures 1 and 2.

### EXPERIMENTAL WORK WITH PLANTS GROWN IN THE OPEN.

*Variation with age.*—Seeds of one apomict, Z.73, collected in May 1937 were planted the following February in a cool greenhouse. The seedlings produced 3 or 4 entire leaves: they were then transplanted to the beds in the open in full sunlight. Deeply lobed leaves were developed throughout the year. A similar sequence was obtained with the morphologically distinct apomict Z.145 when seeds were planted in June. Leaves characteristic of these apomicts are shown in diagrams 1 and 2, Figure 1.

During the second growing season a succession of types of leaf was shown. Detailed records of one plant from a row were made, involving the removal of a leaf at intervals of 14 days throughout the season. One biotype, Z.179, formed deeply lobed leaves in

\* The research on which this paper is based was carried out under the aegis of the Association for the Study of Systematics in Relation to General Biology.

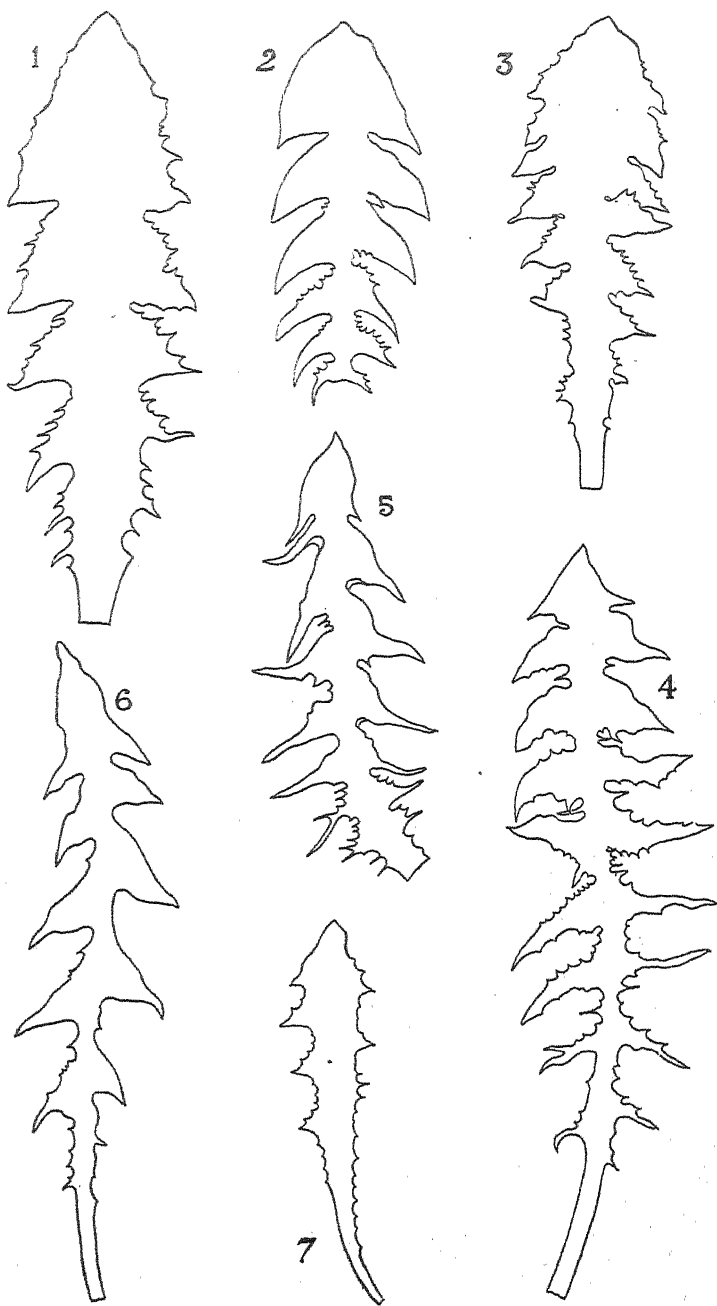


Fig. 1. Outlines of leaves of various biotypes collected at the time of full flowering in the second growing season, April-May, 1936. Reference numbers of biotypes:—1, Z.73; 2, Z.145; 3, Z.179; 4, Z.190; 5, Z.208; 6, Z.193; 7, Z.196. All diagrams  $\times \frac{1}{2}$ .

February 1936, which increased in size until after the plant flowered in April. A typical leaf is shown in diagram 3, Figure 1; the maximum length reached was 17 cm. When fruits formed the leaves were large but less deeply lobed and succeeding leaves were broad, spatulate and had only slightly toothed margins. In October, dissected leaves were again found and these persisted through the winter. They were, however, smaller, the maximum length being 10 cm., and less regularly lobed than the leaves found in the spring. In the third and fourth years of growth, flowering in April was associated with leaves exactly similar to, though rather smaller (maximum length 11 cm.) than, those found in the second year. This sequence is very similar to that recorded for a strain of *T. officinale* by Griffiths (1924).

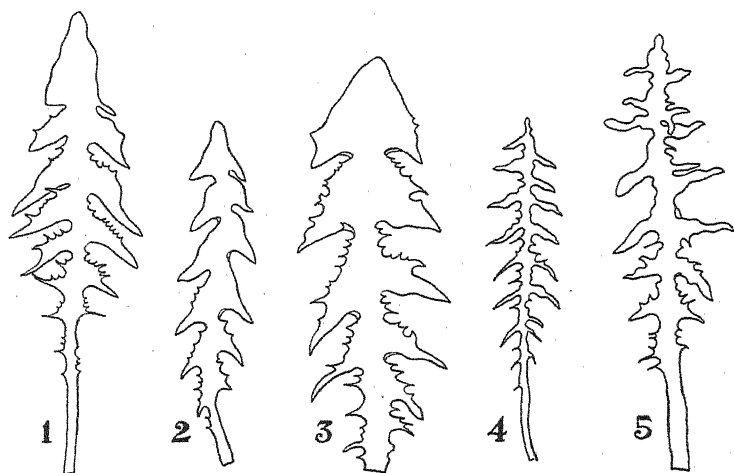


Fig. 2. Outlines of leaves of various biotypes collected at the time of full flowering in the second growing season. Reference numbers of biotypes :— 1, Z.194 ; 2, Z.301 ; 3, Z.257 ; 4, Z.282 ; 5, Z.291. All diagrams  $\times \frac{1}{2}$ .

The succession of leaves in five other biotypes, Z.190, Z.199, Z.208, Z.193, Z.196, recorded during their second year of growth in 1936, was from a deeply lobed type persisting until after flowering in April and May, to an entire non-dissected shape which was found throughout the autumn and winter. The lobed leaves characteristic of those biotypes in May are shown in diagrams 4-7, Figure 1. The sequence of leaves produced by the biotype Z.199 is shown in Figure 3. In two of these strains, Z.193 and Z.196, it appears probable that the persistence of the entire type of leaf was due to the removal of the leaves taken for record, since untouched plants in the same rows produced lobed leaves in October. The normal sequence in these two biotypes would then be similar to that of Z.179. A slightly different sequence was shown by a biotype Z.194 where the early spring leaves were not lobed. Here also, lobed leaves, shown in diagram 1, Figure 2, were associated with

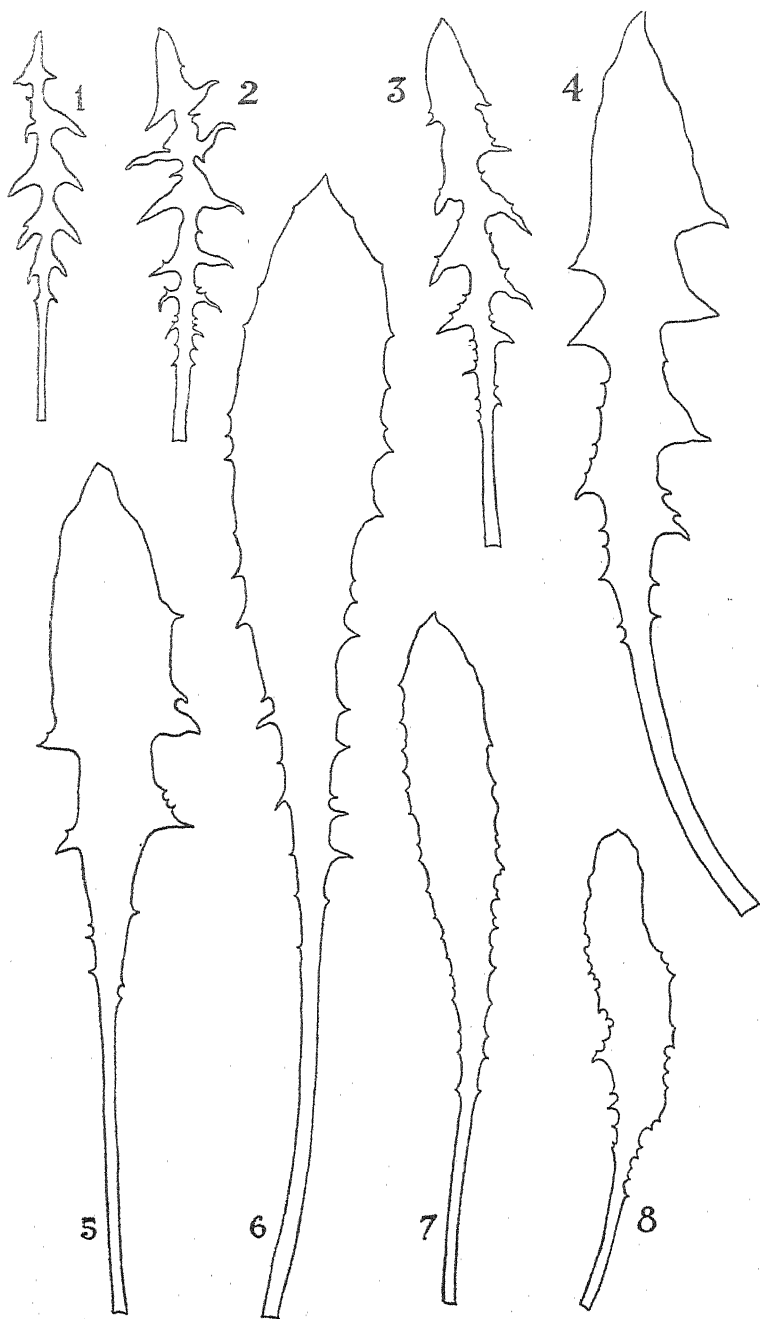


Fig. 3. Outlines of leaves collected from plant Z.199/E during the second growing season. Times of collecting:—1, 14-3-1936; 2, 27-3-1936 (plant flowering); 3, 24-4-1936; 4, 23-5-1936; 5, 3-6-1936; 6, 22-6-1936; 7, 26-8-1936; 8, 10-9-1936. All diagrams  $\times \frac{1}{2}$ .

flowering and were followed by entire leaves. The latter persisted through the winter in a plant from which leaves were removed for record, but in untouched plants were replaced by lobed leaves in the autumn.

During the third growing season all except two of the biotypes described had, at the time of flowering in April, leaves which were less dissected than those found in the second year. The lobes tended to be broader, more irregular and without any of the backward prolongations which were previously characteristic. Leaves collected from a plant of the biotype Z.199 during the third and fourth growing seasons are illustrated in Figure 4. The exceptions were the strains Z.196 and Z.179. Of these, Z.196 died after transplanting and Z.179 repeated the leaf pattern of the previous year.

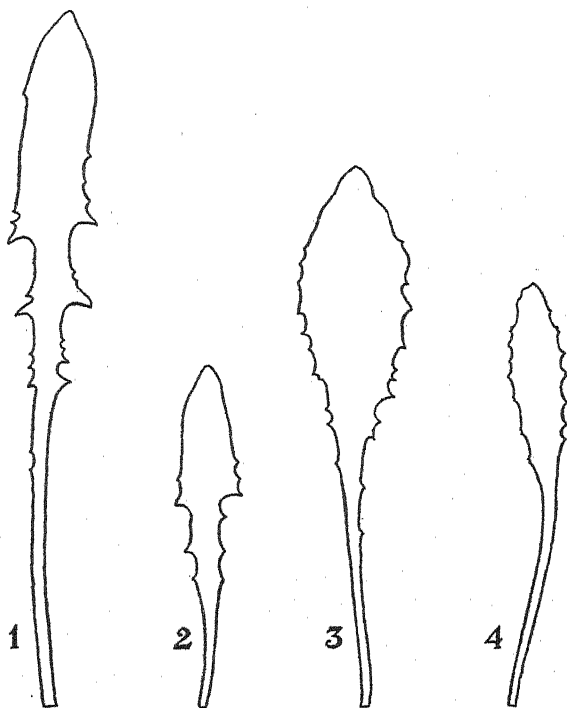


Fig. 4. Outlines of leaves collected from plant Z.199/E during the third and fourth growing seasons. Times of collecting:—1, 25-4-1937; 2, 9-4-1938; 3, 10-8-1938; 4, 14-10-1938. All diagrams  $\times \frac{1}{2}$ .

Older plants of strain Z.145, studied in their fourth and fifth growing seasons, had crowns divided into a number of rosettes. The leaves showed a sequence from an irregularly lobed type in the spring to a less dissected type at the time of flowering: the latter leaf shape persisted through the winter. In all plants the position of the leaves varied according to the biotype and the season and



could be classified as flattened, sub-erect, or erect. In the older plants the leaves remained sub-erect or erect in marked contrast to the flattened position often taken by the leaves of younger plants in early spring.

Some alteration in leaf shape during the ageing of plants grown in special conditions are discussed later.

*Regeneration following injury.*—The regeneration of leaves following the removal of the crowns of plants of different ages was recorded. Three first-year plants, biotypes Z.301, Z.257, Z.282, having deeply lobed leaves (as shown in diagrams 2-4, Figure 2), were used and the crowns removed in July 1937. The new leaves which soon appeared were entire and remained so throughout the winter, affording a strong contrast with the deeply lobed leaves of the undamaged plants of the same strain. In the following spring the three plants with regenerated crowns had lobed leaves, the plants flowered and were indistinguishable from the undamaged plants in their rows. The new rosettes here repeated, though more slowly, the sequence of leaves developed by the seedling. They may be compared with the plants studied by Sears (1922). When the crowns were removed in May 1937 from three four-year-old plants of the apomict Z.145 already described, the new leaves developed in June were slightly and irregularly lobed but were identical with those found at the same time on undamaged plants of the same age. They also followed the same sequence of changes, which was recorded until autumn of the following year.

In a plant of the biotype Z.208 the leaves were eaten and completely destroyed in June, during the second growing season; the growing point, however, remained. The new leaves produced were all lobed and comparable with those of undamaged plants of this strain.

The plants (ramets) obtained by cloning an old plant showed a definite but slow change in leaf form, from an entire to a dissected type. Plants five to six years old having crowns consisting of a number of rosettes with entire leaves, were divided; about twelve ramets from each of the two plants used were planted in soil new to dandelions. The apomicts used were Z.145, cloned in September 1937, and Z.73, cloned in November 1937. In the following June the leaves of the ramets were entire and very similar to those of the old plants of the same stock, the largest leaves of ramets of Z.73 were about 12 cm. long. In October the leaves of the ramets had become large, for Z.73, 23 cm. long, and dissected, in contrast to the smaller entire leaves of the old plants. The largest leaves of the old plants of Z.73 in October measured 13 cm. in length. In these experiments some of the rosettes planted had all the old leaves removed, in others they were allowed to remain. Various amounts of the old root were left. The ramets which developed showed no differences corresponding to these different

treatments. Further experiments on the regeneration of plants grown under special conditions in a greenhouse are discussed later.

*The influence of food supply.*—Two sets of culture experiments carried out with small numbers of plants to test the effect of the supply of the elements nitrogen and calcium, suggest that the fully lobed leaves characteristic of a particular biotype are developed only if these elements are provided. In the first experiments, begun in July 1937, the apomicts Z.145 and Z.73 were used. Seedlings having about three leaves, the largest not more than 8 cm. long, were planted in sand in 7 in. pots which were sunk in the open, exposed to full sunlight. Three plants of each apomict received a culture solution poor in nitrates and the same number received a complete solution containing additional nitrates. Two months later the plants deprived of nitrates had leaves slightly but definitely less dissected than those of the controls.

Further experiments were carried out in September 1938 in the laboratory, using the apomict Z.73. Seedlings were again grown in sand and the pots placed in sunlight. Three plants received a complete culture solution, three a solution poor in calcium, and three a solution without nitrates. Three months later the plants having the complete solution had an average number of 22 leaves,

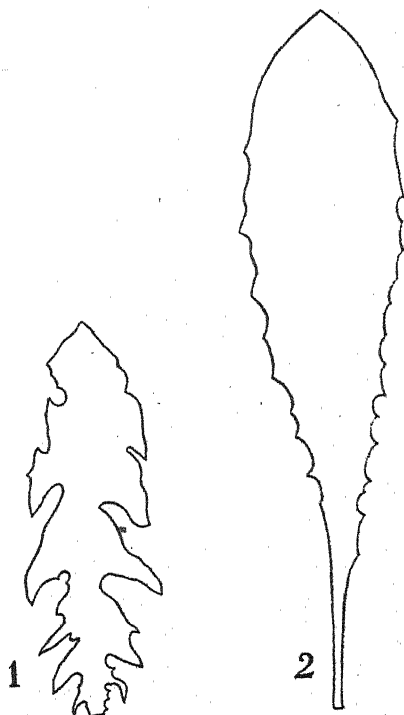


Fig. 5. Outlines of leaves from plants of the biotype Z.145. Seed planted 28-5-1937: leaves collected 21-9-1937. 1. Plant grown in sunlight. 2. Plant grown in the shade. Diagrams  $\times \frac{1}{2}$ .

the eighth or ninth and succeeding ones being lobed ; those receiving a poor supply of calcium had an average of 18 leaves, slightly less lobed. Those without nitrates had only 6 leaves, which were entire. The nitrogen starved plants, obviously retarded in their development, presented a marked contrast with the differently treated plants of the same age ; they may be compared with the plants described below, which were grown in dull light.

*The influence of light.*—Preliminary experiments with two apomicts Z.145 and Z.73 showed the very marked influence of light on leaf form. Seedlings from the same batch as those used for the first culture experiments were planted in July 1937 in pots using garden soil. Three pots containing plants of the apomict Z.145 and four of Z.73 were sunk in the ground in the open and exposed to full sunlight. The same number of plants in pots were sunk in the ground in a position shaded throughout the day by a large lime tree. As far as possible, all the plants were kept equally moist. Two months later the plants grown in sunlight had flattened rosettes of lobed leaves, the largest formed by Z.73 being 9.5 cm. long ; the plants grown in the shade had sub-erect rosettes the leaves being larger, for Z.73, 15.5 cm. long, and entire. Leaves from plants of the apomict Z.145 are shown in Figure 5.

The total number of leaves produced by plants grown for three months in the sun was considerably greater than that formed by plants of the same age grown for the same time in the shade. The average numbers were approximately, for Z.145, 13 in the sun, 5 in the shade ; for Z.73, 18 in the sun, 7 in the shade. One plant of the apomict Z.73 was in a position reached by sun flecks and it was noticeable that the leaves of this plant were more dissected than those growing in the complete shade.

#### EXPERIMENTAL WORK WITH PLANTS GROWN UNDER SPECIAL CONDITIONS.

*Treatment with growth substances.*—In order to test the possibility that the differences in leaf shape might be connected with the supply of growth hormones, plants were grown at Kew in a cool shaded greenhouse where the conditions were such that entire leaves were formed. The seedlings were then treated with the three growth substances  $\alpha$  naphthaline acetic acid,  $\beta$  indole acetic acid, and  $\beta$  indole butyric acid. Solutions of two concentrations were used, 1:20,000 and 1:2000. These were prepared by dissolving the weighed quantity of the growth substance in a small amount of methylated spirit, after which the required volume was made up with tap water. About 6 cc. of the solution was sprayed on the leaves of each plant by an atomiser. The growth substances were also applied in lanoline paste prepared by warming 1 gm. of hydrous lanoline until it just melted, when .05 gms. of the substance were stirred in. The paste was applied when it was cold, to the growing point or youngest leaves of the plant.

In the first experiments only  $\beta$  indole acetic acid solution of the lower concentration was used. Seedlings of the apomict Z.73, which had two or three leaves between 2 and 3 cm. in length, were treated at the beginning of May 1938. Six plants in the greenhouse were sprayed and as controls six untreated plants were grown in the greenhouse. Plants were also grown in pots sunk in the ground in the open in full sunlight and of these, six were sprayed with  $\beta$  indole acetic acid solution and six left as controls. No response to the first application of the growth substance was obtained and the treatment was repeated every fourth day for thirty-two days, but without positive results. In August, treated and untreated plants in the greenhouse had exactly similar entire leaves, 18 cm. long, like those produced by this biotype when grown in the shade in the open in previous experiments. The plants grown in sunlight had more numerous and deeply lobed leaves. The plants sprayed with  $\beta$  indole acetic acid appeared to be somewhat more vigorous than the controls.

In further experiments, seedlings of the apomict Z.145 were treated with solutions of the three growth substances at the higher concentration. Seedlings having three leaves, the largest 6 to 7 cm. long, were selected at the end of June 1938. Six plants grown in the greenhouse were treated with each solution and six untreated plants were grown in the greenhouse and in the open. Twenty-four hours after treatment the leaves of all the plants sprayed were rolled tightly outwards; five days later they remained only slightly curled. After seventeen days differences were noticeable between the sets of plants, those sprayed with  $\alpha$  naphthaline acetic acid had made no apparent growth, those sprayed with  $\beta$  indole acetic acid were growing vigorously, while those treated with  $\beta$  indole butyric acid were less vigorous than the control plants or those which received  $\beta$  indole acetic acid. At the beginning of October the control plants in the greenhouse had six entire leaves, the largest being 23 cm. long. The leaves of all the plants grown in the greenhouse and sprayed with growth substances were of this same shape, the only difference seen between the sets of plants was in the amount of growth made. Of the plants treated with  $\alpha$  naphthaline acetic acid, two had died, two were very retarded, having only three leaves, less than one third the size of those of the controls, and two were making fairly good growth. Plants which received  $\beta$  indole acetic acid continued to grow rather more strongly, and those which received  $\beta$  indole butyric acid rather less strongly, than the controls. The plants in the sun had at this time eighteen deeply lobed leaves, the largest 19 cm. long.

Experiments using the same three growth substances in lanoline paste were also begun in June, using the seedlings of the apomict Z.145. Six seedlings were treated with each growth substance. Twenty-four hours after treatment the leaf bases had become bent so that the leaves were flattened instead of in a sub-erect position.

Some flattening persisted for twelve days and the tips of the youngest leaves in contact with the paste did not develop. A second application of paste was made fourteen days after the first. After a further twenty-four hours the application of  $\alpha$  naphthaline acetic acid and of  $\beta$  indole acetic acid had caused flattening of the leaves but treatment with  $\beta$  indole butyric acid had no visible effect. In October the plants treated with  $\alpha$  naphthaline acetic acid had all died, those treated with  $\beta$  indole acetic acid were indistinguishable from the controls, those treated with  $\beta$  indole butyric acid were similar in growth but less vigorous.

The shape of the leaf produced by the apomicts Z.73 and Z.145 when grown in dull light for seven months is seen to be unaltered by the application of the three growth substances  $\alpha$  naphthaline acetic acid,  $\beta$  indole acetic acid and  $\beta$  indole butyric acid, although these substances may affect the general vigour of the plant.

The effect of the growth substances contained in the proprietary product "Auxan," on plants of the strain Z.145 was tested. A five-year old plant was taken in August 1938 and sixteen ramets obtained from it. On the crowns taken, three or four leaves were retained, the largest not more than 6 cm. long. A length of 2-3 cm. of root was left and was cut across diagonally. The roots of eight ramets were dipped in "Auxan" and four planted in the sun and four in pots in a shaded greenhouse. The same number of untreated ramets were planted as controls. All the plants made new growth but no difference between treated and untreated plants was seen at any time during the six months that the experiment was in progress.

*An experiment in grafting.*—If the difference between the leaves formed by plants of the same biotype grown in the sun and in the shade is connected with the presence of hormones effective only in certain conditions, it is conceivable that such growth substances might pass across the cut surfaces of a graft and influence the new leaves developed from graft or stock. Plants of the apomict Z.73 were used in this experiment. One plant, grown from seed planted in February 1938, in a pot sunk in the ground in the open, had in August developed a crown of characteristic lobed leaves. The pot was then taken to a cool shaded greenhouse and the crown of the plant removed. Two other plants of the same age which had been grown in the shade and had entire leaves were also taken and the crown removed from one of them. From the other, the leaves were removed and the crown cut to the shape of a wedge 1.5 cm. in length. This was used as the graft and inserted in a wedge-shaped incision in the root of the plant grown in the sun. Graft and stock were bound together. The plants were kept in the greenhouse. Four weeks later the plant grown from seed in the shade had developed entire leaves, while the graft had leaves slightly and irregularly lobed. No leaves were at this time developed from the stock, but after a further three weeks slightly lobed leaves were

found. These types are illustrated in Figure 6. The graft did not continue to grow; graft and stock became separated by layers of cork. The result of this experiment, suggesting some influence of stock on graft, needs to be confirmed by a number of further experiments with grafts and must also be interpreted in the light of the experiments on the regeneration of crowns and of the data on the development of leaves, given below.

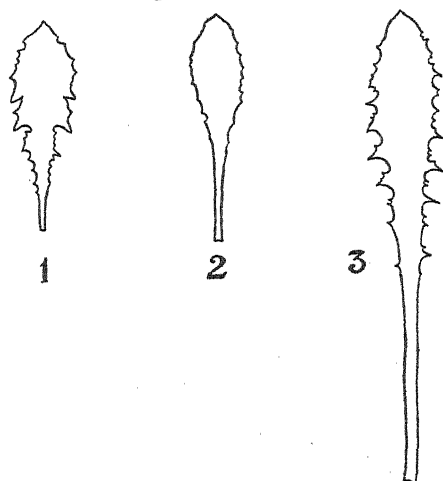


Fig. 6. Outlines of leaves from plants of the biotype Z.73, grafted six months after germination. 1. Leaf from graft taken 4 weeks after grafting. Plant grown in the shade. 2. Leaf growing from cut crown of a plant grown in the shade, 4 weeks after the crown was removed. 3. Leaf from stock taken 7 weeks after the crown was removed and graft made. All diagrams  $\times \frac{1}{2}$ .

*Regeneration following injury.*—Four plants of the same apomict, Z.73, as those used in the previous experiment were taken in October 1938. They had been grown from seed planted in the previous March in pots sunk in the ground in the open. The plants had produced deeply lobed leaves. The main roots had grown through the drainage holes of the pots to the soil below and were broken across when the pots were removed. The crowns of the plants were cut off and the pots placed on their sides, three in the shaded greenhouse and one in the open. Dandelions quickly develop numerous buds when the crowns are removed: if a growth substance influencing growth shape were present and this diffused downwards, the buds developed at different levels might show the influence of the hormone in varying degrees.

Seven weeks after the crowns were removed new leaves had developed at the anterior ends of all the plants. Also in two of the plants grown in the greenhouse callus had formed at the distal ends of the cut roots and in one of them leaves were also produced from this end. Three months later the plants presented a very varied appearance: that in the open had broad dissected leaves, and of the plants in the greenhouse one had entire leaves and one having five

buds had only entire leaves developed from three of them, but slightly lobed leaves were formed from the two lower buds. In the latter plant lobed and entire leaves were, three weeks later, found in the same bud. The remaining plant continued to develop leaves at each end of the root. These are shown in plate 1, fig. 1, taken in February 1939, twenty weeks after the crown of the plant was removed. Nine leaves were developed from the distal end: these were definitely lobed, dark green in colour and had hairs scattered over midrib and blade. The fifteen leaves formed at the anterior end were, with the exception of two slightly lobed leaves produced from buds at the lowest level, entire; they were lighter in colour and hairs were less numerous. The leaves at each end of this plant had been exposed to similar external conditions, although the rim of the pot would possibly have caused additional shading during the early stages of development of the leaves at the anterior end.

*Variation with age of plants grown in the shade.*—The plants treated with growth substances in May and June 1938 were, with the control plants, grown in the shaded greenhouse for a further twelve months. For several months only entire leaves were developed in contrast to the deeply lobed leaves produced by plants of the same stock and age grown in full sunlight. Later, the shaded plants showed a sequence of leaf-forms irrespective of their treatment with growth substances but depending on the age of the plant from seed and it appears that the effect of shading is to retard rather than to inhibit completely, the production of lobed leaves by biotypes normally producing them. Plants of the apomict Z.73 grown from seed planted in February 1938 had at the end of October developed lobed leaves; plants of the same strain grown in the same conditions from seed planted in November 1937, formed slightly lobed leaves in the following May and distinctly lobed ones in August. Plants of the apomict Z.145 behaved similarly; those grown from seed planted in June formed lobed leaves at the end of November. The lobed leaves formed in these conditions were characteristic for the biotype but distinct from those developed in full sunlight. They are illustrated for Z.73, in Figure 7. In these experiments the shading of the greenhouse was not absolutely complete, sunlight penetrated for a short time in the early mornings during July and October.

*The influence of moisture.*—Seedlings of the apomict Z.73 planted in pots in April, were grown in the greenhouse as in the previous experiments. Four plants were given only sufficient water to prevent wilting; four similar plants, watered freely, were covered by a bell jar. Control plants were given a liberal amount of water but were left uncovered. In August the leaves of all the plants were entire, but there were some differences in their proportions: the leaves of plants kept dry were shorter (maximum length 16.5 cm.) and those of the plants grown in a moist atmosphere were longer (maximum length 21.5 cm.) than those of the controls, the maximum

Fig. 1. Plant of the biotype Z.73, showing leaves formed from buds developed after the crown was removed and the root cut across; original crown on left.

Photo. taken 27.2.39.  $\times \frac{1}{3}$ .

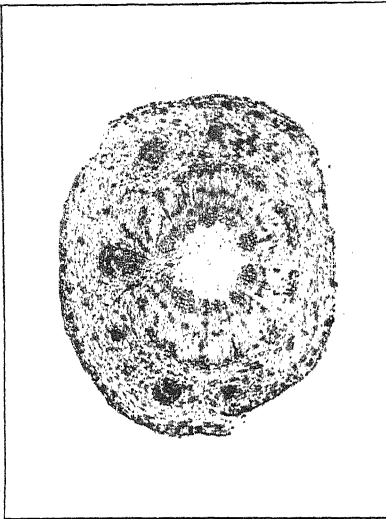
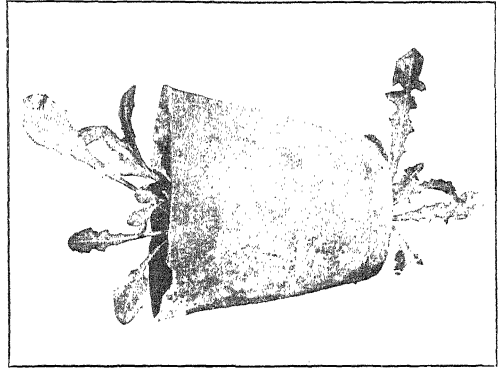


Fig. 2. Transverse section of young vertical rhizome.  $\times 17$ .

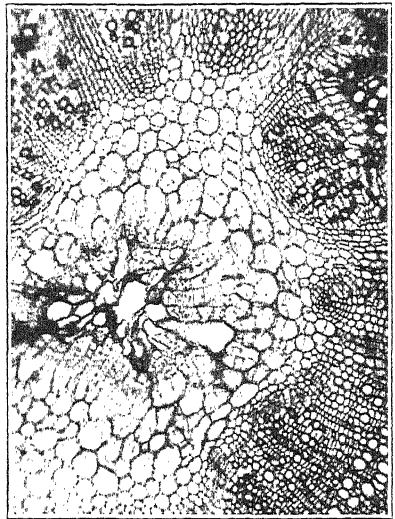


Fig. 3. Transverse section of the crown of a plant before the elongation of the inflorescence axis.  $\times 47$ .

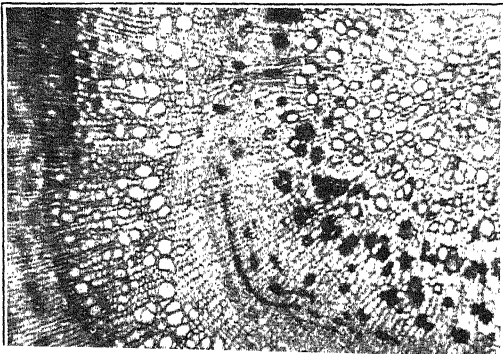


Fig. 4. Transverse section of root showing secondary cambium.  $\times 41$ .





length of which was 19 cm. In September, lobed leaves were formed by the plants kept dry and in December three of these plants had only lobed leaves. The crown of the fourth plant had divided, although no inflorescence axes could be seen, and the two rosettes had entire leaves. The new rosettes, as in the plants described by Sears (1922), developed a leaf shape characteristic of young plants. The three plants with lobed leaves contrasted strongly with those kept very moist; in these only entire leaves were found. Drought was seen to increase the dissection of the leaves when the dry conditions obtained for several months.

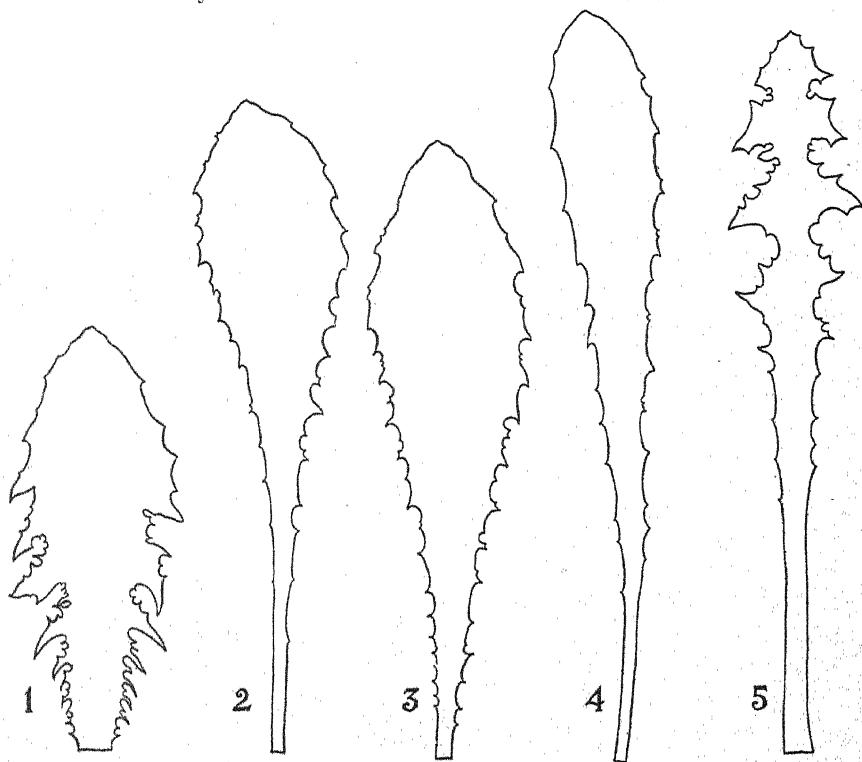


Fig. 7. Outlines of leaves from plants of the biotype Z.73 grown in different conditions. Diagrams 1-4, leaves from seed planted February 2nd, 1938. Diagram 5, leaves from seed planted November 15th, 1937.

1. Plant grown in the open in sunlight. 2. Plant grown in unheated greenhouse, shaded. 3. Plant grown in unheated greenhouse, shaded, kept dry. 4. Plant grown in unheated greenhouse, shaded, kept very moist. 5. Plant grown in unheated greenhouse, shaded. All diagrams  $\times \frac{1}{2}$ .

Pearsall & Hanby (1926), in a study of the modifications of the leaf as laid down in the bud and the development of its final form in some woody Dicotyledons, have shown that leaf growth is affected by hydrostatic pressures, being increased by positive pressures and restricted by negative ones. They found that the seasonal variations in leaves such as those of sycamore could be explained by the

variation in internal hydrostatic pressure. Sycamore leaves were more dissected in the summer when conditions were such that a negative pressure was produced. Griffiths (1924) referring to a preliminary account by Pearsall & Priestley, on factors affecting leaf form, suggested that the leaf of *Taraxacum* might be particularly sensitive to changes in water pressure, a low water pressure being associated with dissected leaves.

#### DEVELOPMENT AND STRUCTURE OF THE LEAVES.

The foliage leaves are arranged to form the characteristic rosette at the surface of the ground, the internodes of the stem remaining very short. The phyllotaxis is commonly  $\frac{3}{8}$  but, as in other rosette and semi-rosette hemi-cryptophytes such as *Crassula orbicularis* described by Raunkiaer (1934), the vertical members of a series sometimes show a slight divergence from strictly superimposed rows.

The persistence of the leaves varies with the biotype and with the season. At the end of August 1936, actively growing leaves of the biotypes Z.193, Z.196, and Z.208 were marked when they were 6-8 cm. long. Fourteen days later the leaves had reached their full size for the season, in Z.193, 16.5 cm., in Z.196, 12 cm., in Z.208, 9 cm.; they were withering thirty days after they were first marked.

The total number of leaves developed by a plant of a particular biotype in a certain time was found to depend on the environmental conditions. Figures have been given to show the larger number of leaves developed by plants given a complete culture solution in comparison with the number formed by nitrogen starved plants in the same time. Preliminary experiments to compare plants grown in the sun and in the shade showed that the plant grown in the sun formed the larger number. In a further experiment of this kind, seed of the apomict Z.73 was planted in February 1938. A plant grown in the sun had in November 1938 developed more than 100 lobed leaves, vigorous flowering had taken place in October and the crown had become divided into a number of rosettes. A plant of the same age grown in the shade had in November produced only 19 entire leaves. Development in these apomicts was therefore much more rapid in the sun than in the shade.

The lobed leaves characteristic of a particular biotype are laid down at a very early stage in the development of the rosette. The smallest leaves, 0.56 mm. in length, that could be dissected from the growing points of plants of the apomict Z.73 grown in the sun for five months, showed clearly the four lobes characteristic of the mature leaf. The material examined was cleared in lactic phenol and in the leaves 0.56 mm. long, vascular tissue was found to be indicated only by elongated cells in the position of the midrib. The ratio of the width of the leaf across the sinus to that across the lobe, measured at right angles to the midrib, varied from 1 : 1.3, to 1 : 1.9, in five leaves measuring between 0.56 mm. and 2 mm. in

TABLE I.

*Number of Cells in Sections taken across Sinus. Width of Blade, 3.65 mm.*

Number of cells in Upper Epidermis*	Number of Stomata	Number of cells in palisade	Number of air spaces of width greater than 1 palisade cell.
154	9	198	8
160	8	180	8
161	5	177	8
153	7	199	6
156	5	193	10
152	8	179	9
159	6	181	7
161	7	186	8
163	7	191	7
156	9	192	8

Average number of epidermal cells per mm. (stoma counted as 1 cell), 45.

Average number of palisade cells per mm. (1 air space counted as 1.5 cells), 52.

TABLE II.

*Number of Cells in Sections taken across Lobe. Width of Blade, 5.55 mm.*

Number of cells in Upper Epidermis	Number of Stomata	Number of cells in palisade.	Number of air spaces of width greater than 1 palisade cell
238	15	268	18
239	11	286	10
249	12	280	8
226	13	256	12
235	11	275	12
240	12	270	15
242	12	278	10
238	11	269	13
241	10	272	12
236	11	279	13

Average number of epidermal cells per mm. (calculated as above), 45.

Average number of palisade cells per mm. (calculated as above), 53.

\* Actual counts of "cells" as seen in transverse sections. Possibly the actual number of cells is somewhat lower owing to irregularity in contours and the counting of lobes as cells. The same remark applies to the next table. The figures in the two tables should, however, be considered comparable in general terms.

length. The proportions were 1:1.8, to 1:2.3, in five leaves measuring between 9 cm. and 11.5 cm. in length.

The later development of the young leaves in the bud, involving the maintenance of the degree of dissection seen at early stages and some increase in it, would appear to be brought about by cell division rather than by alteration in the size of the cells laid down. This is shown by the data in Tables I and II giving details of the numbers of cells seen in transverse sections of a leaf collected in September 1939 from a plant Z.73/F grown in the sun for six months. Serial sections of the leaf were cut at a thickness of  $15\mu$  and the number of cells in the upper epidermis and in the adjoining palisade layer were counted.

An attempt to correlate the form of the mature leaf with the time of development of the primordium in the bud showed that in plants of the biotype Z.291, the leaves developed at the time of flowering in May were probably present in the bud in February. The plants studied were grown in the ground in the open and collected during their second growing season, the crown of each plant selected having divided into three rosettes. The dissected leaf characteristic of this biotype at the time of flowering is shown in diagram 5, Figure 2. The number of leaves and of inflorescence axes developed and the number that could be dissected from the buds was determined in February, before active growth began and in May, after the plants had flowered. The data for these plants are given in the following table:

TABLE III.  
*Number of Leaves and Inflorescence Axes developed by Plants of the Biotype Z.291.*

	Plant collected 7/2/1939			Plant collected 14/5/1939		
	Number of leaves developed	Number of leaves dissected from growing point	Number of inflorescence axes	Number of leaves developed	Number of leaves dissected from growing point	Number of inflorescence axes
Crown I	21	24	9	23	2	8
Crown II	9	22	11	28	2	12
Crown III	8	25	16	32	3	15
Totals for 3 crowns	38 +	71	36	83 +	7	35

Although data of the persistence of the leaves of this biotype have not been obtained, comparison with plants of the biotypes Z.193,

Z.196, Z.208, previously described, suggests that the leaves persist for only a few weeks after they are mature. Leaves of the biotype Z.291, functional in the autumn, would then develop from primordia not visible until after flowering.

A study of the vein islets in leaves, that is the areas enclosed by the smallest veins, has been suggested as a criterion of senescence: Bijhouwer (1931) has drawn attention to the literature on this subject. For *Taraxacum*, Sears (1922) found that the changes in leaf shape were independent of the number of vein islets per unit area of leaf. The present work on certain biotypes of *Taraxacum* confirms the lack of correlation between leaf shape and the number of vein islets per unit area. The areas of leaf examined were taken from the middle of the blade in the region between midrib and margin, they were decolourised and cleared in lactic phenol to which a little cotton blue had been added. The numbers of vein islets and of free vein endings in twelve such areas each of 1 sq. mm. were counted and the average taken. The appearance of the vein islets in a mature leaf of the plant Z.193/D is shown in Figure 8.

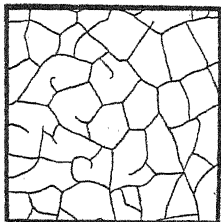


Fig. 8. Vein islets in a leaf of the plant Z.193/D. Area shown = 1.5 sq. mm.

Mature leaves from plants of eight biotypes grown in similar conditions were examined. The number of vein islets per sq. mm. did not prove to be characteristic for a biotype and a high degree of variation was found in the mature leaves of one plant. No significant difference in number was shown by the entire and dissected leaves formed by one plant at different ages. If the shape of these leaves is connected with the pressure of water supply a difference might be expected, since Pearsall & Hanby (1926) found that an increase in hydrostatic pressure resulted in an increase in the number of veins and the formation of smaller vein islets. Some difference was found in leaves of plants of the same age taken from each of two stocks grown in the sun and in the shade. The differences, however, were of the same order as those previously obtained in one plant. Details of the numbers of vein islets per sq. mm. of leaf are given in Table IV.

An examination of the larger veins in *Taraxacum* leaves showed that in many entire leaves the lateral veins diverged from the midrib making an obtuse angle towards the base of the leaf. In lobed leaves the lateral veins either diverged approximately at

TABLE IV.  
*Number of Vein Islets per sq. mm. of Leaf Blade.*

Plant	Type of leaf	Date collected	Number of islets per sq. mm.		Number of vein endings per sq. mm.			
			Average of 12 areas	Maximum	Minimum	Average of 12 areas	Minimum	Maximum
Z.179/B	Dissected	8/5/36	16.1	20	9	3	6	0
Z.193/D	"	"	14.9	22	11	4.9	9	0
Z.199/E	"	"	16.1	26.5	8	1.9	6	0
Z.194/E	"	"	8.2	10	6	3	7	1
Z.196/C	"	"	11.9	14	9	1.5	3	0
Z.200/E	"	"	11.7	16	9.5	6.4	10	1
Z.208/C	"	"	16.9	28	11	1.4	4	0
Z.208/A	Entire	25/10/35	6.5	9	4.5	2	4	1
Z.208/A	Dissected	"	8.8	14	5	1	4	0
Z.145/D	"	8/5/36	14.4	23	12	3	5	1
"	Entire	25/10/35	12.6	19	6.5	5.8	14	2
"	"	"	4.9	7	1.5	4.2	4	1
"	"	"	9.9	13	7	3.2	8	0
"	Entire young	"	12.1	18	9	1.6	5	0
Z.145/sun	Dissected	21/9/37	14.6	19	9	3.1	7	0
Z.145/shade	Entire	"	4.7	7	4	3.9	4	2
Z.73/sun	Dissected	10/8/38	11.1	13.5	9	5.2	12	1
Z.73/shade	Entire	"	6.3	8.5	4	5	7	3

right angles to the midrib or the angle of divergence was similar to that found in the entire leaves, but the lateral veins bent sharply, often at right angles, to supply the lobe. It was not possible, however, to obtain a strict correlation between the degree of lobing and the path of the lateral veins.

In transverse section, the blade of a mature leaf taken from a plant grown in the sun showed two rows of palisade cells which were only slightly elongated in a direction at right angles to the blade. Four to six rows of rounded cells made up the mesophyll. Air spaces were numerous throughout. Stomata occurred in both upper and lower epidermis and were raised a little above the surface. The entire leaves characteristic of a plant grown in the shade were thinner than the lobed ones formed by a plant of the same age growing in sunlight. Often in the "shade" leaves only one clearly defined layer of palisade cells was found and fewer layers of spongy parenchyma. Transverse sections of "sun" and "shade" leaves are shown in Figure 9. No significant anatomical differences were noticed between the lobed leaves and the non-dissected ones found at a later stage in the life of the plant. All of the older leaves of plants that were examined in the summer and autumn were infected by the fungus *Puccinia Taraxaci*. A characteristic feature of all leaves collected after exposure to conditions suitable for photosynthesis, was the occurrence of oil drops in the cells: generally one large drop was found in every cell of the mesophyll.

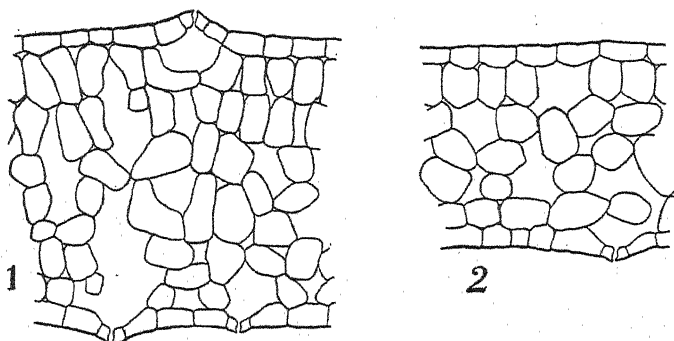


Fig. 9. Transverse sections of leaves of plants of the biotype Z.73, collected 22-9-38. 1. Plant grown in the sun. 2. Plant grown in the shade. Diagrams  $\times 240$ .

#### ROOT STRUCTURE.

The young roots examined had a diarch structure. The central relatively small mass of xylem was composed of tracheids and vessels having close annular, spiral or scalariform thickenings. Pitted vessels were not found. Medullary rays were prominent. In older roots, which have been described by DeBary (1884), the bulk of the fleshy part was made up of secondary phloem consisting of parenchyma, sieve tubes and articulated laticiferous vessels. The occurrence of sieve tubes is of interest: Jeffrey (1917) recorded this



fact, but denied that the development of the milk system is in inverse proportion to that of the sieve tubes; he found that in the root of *Taraxacum* sieve tubes could not be clearly distinguished from laticiferous vessels. In the material now studied sieve tubes occurred abundantly although they could not be identified with certainty in stained sections and special methods were necessary for their isolation. The sieve tubes were isolated in sections macerated in acid alcohol for twenty-four hours (one part of hydrochloric acid to four parts of alcohol) and subsequently treated with 10 per cent. ammonia. In sections of old roots collected in the autumn the callose on the sieve plates could be stained with corallin soda, with Russow's callus reagent or with aniline blue. In transverse sections of the roots, sieve tubes and laticiferous vessels occurred in groups arranged in concentric circles in the parenchyma. The parenchyma cells formed regular radial and vertical rows with air spaces between them. The narrow sieve tubes were approximately the same length as the parenchyma cells, and sieve plates which were transverse or nearly so, occurred on the end walls at the level of the transverse air spaces in the parenchyma. At this level also, anastomoses between the laticiferous vessels were most frequent, hence the sieve plates were easily overlooked unless special methods were used to demonstrate their presence. Sieve tubes, laticiferous vessels, and the parenchyma of the secondary phloem are shown in diagrams 1 and 2, Figure 10.

In the cortex of the root and of the stem, structures superficially resembling laticiferous vessels were found. The tangential walls of a small group of parenchyma cells had thickened, partly broken down and separated so that an intercellular space was formed such as is illustrated in diagram 3, Figure 10. The space so formed sometimes contained a secretion. These cavities are similar to the "pseudo-canals" noted by Col (1903) in other *Liguliflorae*.

Secondary thickening in the root resulted mainly in the addition of phloem, only a little xylem was added. Cork cambia, first formed in the outer layers of the cortex and later in the phloem, prevented any considerable or regular increase in the diameter of the root. It was not found possible to determine the age of a plant by counting the "annual rings," as suggested by Roberts (1936).

#### STEM STRUCTURE.

The region which could be identified anatomically as stem in a normally grown plant, was very short, a length of less than 1 cm. below the growing point of the crown. The upper part of the stem bearing the closely packed leaves of the rosette had a structure complicated by the crowded and overlapping leaf bases. This short stem may be compared with the long vertical underground stems which were sometimes found to develop from buds which arose adventitiously on pieces of the roots of old plants when such roots had been broken across and were left or had become buried in the

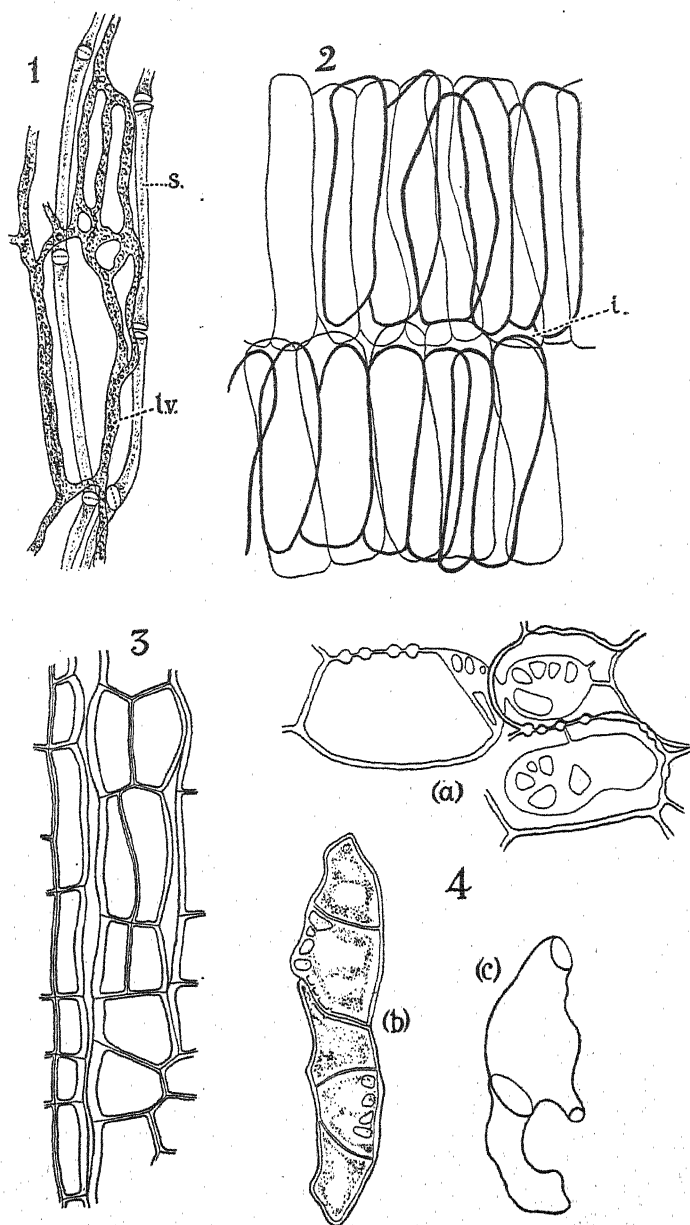


Fig. 10. 1. L.S. root, macerated to separate sieve tubes. s=sieve tubes; lv.=laticiferous vessel. 2. L.S. root, parenchyma of secondary phloem. i=intercellular space. 3. L.S. root, "pseudo-canals" in cortex. 4. (a), T.S. apex of crown, pitted parenchyma cells of pith. (b), (c), apex of crown, macerated to separate the cells of the pith. All diagrams  $\times 240$ .

soil at a depth of 12-20 cm., the rest of the plant having been removed. When roots with secondary phloem were cut across and kept moist, wide V-shaped longitudinal splits were often formed, extending inwards. The uninjured cells were rapidly protected by cork. In the broken roots described, at the anterior ends and at places where splits extended to the central xylem cylinder, callus formed and bore buds from which long stems grew up towards the surface of the soil. The stems, which were twisted, bore scale leaves. The internodes were 2-3 cm. in length at the lower end but shorter at the upper end, while at the surface of the soil a typical rosette of leaves developed. The scale leaves had sheathing bases which completely or nearly encircled the stem, the line of attachment being horizontal or oblique. It was possible to trace the fusion of the decurrent leaf base with the stem through at least one internode. The free portion of the scale leaf was pointed in shape and readily withered from the tip. The whole of the blade sometimes disappeared and the decay spread downwards along the part of the base fused with the stem. Branches arose from buds in the axils of some of the scale leaves; they were often very numerous near the ground level. They emerged making almost a right angle with the main stem and bent to grow up nearly parallel with it.

In transverse section an elongated vertical underground stem showed the familiar Dicotyledonous stem structure, a ring of collateral vascular bundles separated by prominent medullary rays; this is seen in plate I, fig. 2. Each vascular bundle of the stem had a number of well developed laticiferous vessels on the outer margin of the protophloem, representing the pericyclic laticiferous system described by Solereder (1908). Leaf gaps occurred in the ring of bundles. Leaf traces, collateral and concentric bundles and isolated groups of phloem and laticiferous vessels were found in the cortex. As secondary phloem was developed, groups of sieve tubes and laticiferous vessels were formed as in the secondary phloem of the root.

The upper, stem portion of the crown showed the same arrangement of tissues, leaf traces being more numerous in the cortex. Longitudinal sections of the crown showed very clearly the anastomoses between the laticiferous vessels of the protophloem, secondary phloem, and leaf traces.

As cork formed readily in the secondary phloem, outer structures were soon removed, but a careful study of the underground stem, the developing crown and the hypocotyl of the seedling (shown in diagram 2, Figure 11) strongly suggests that in accordance with the leaf skin theory of Saunders (1922), the external tissues of these organs are formed by the leaf bases which are decurrent and fused with the outer layers of the stem.

Near the apex of the stem the pith consisted of a characteristic spongy tissue. The cells had thick cellulose walls: the tangential

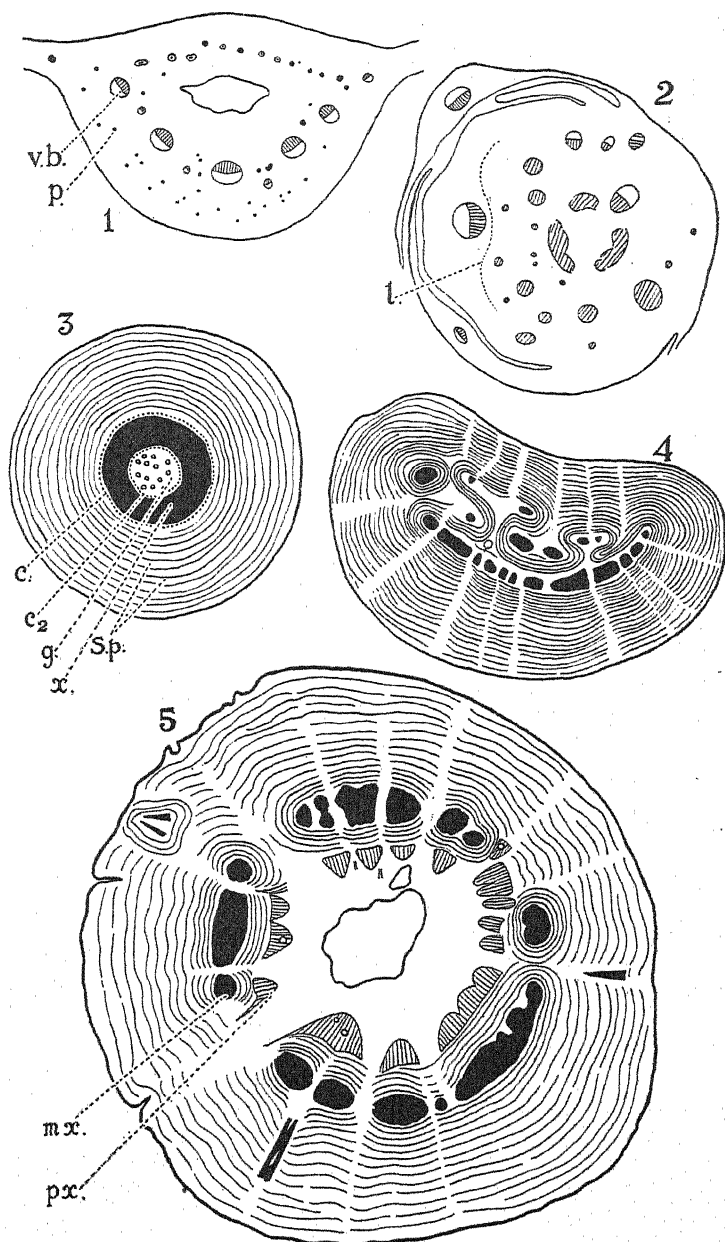


Fig. 11. 1. T.S. leaf base,  $\times 13$ . v.b.=vascular bundle. p.=groups of phloem and laticiferous vessels. 2. T.S. hypocotyl of seedling,  $\times 33$ . l=line of future separation between leaf and stem. 3. T.S. root,  $\times 8$ . c=cambium; c<sub>2</sub>=secondary cambium; g=deposits of gum in xylem; s.p.=groups of sieve tubes and laticiferous vessels in the secondary phloem; x=functional xylem. 4. T.S. "branch" formed by longitudinal splitting of the crown,  $\times 2$ . 5. T.S. base of crown in an old plant,  $\times 4$ . px.=protoxylem of original bundles; mx.=metaxylem.

walls were especially thick and tended to separate so that concentric circles a few cells in depth, resulted. The cells were often irregular in shape, sometimes with outgrowths pushing into the intercellular spaces. Between some of the adjoining cells the end walls had broken down or were perforated by large simple pits so that an irregular series of canals was formed. Some cells from this tissue are shown in diagram 4, Figure 10. It is in this spongy pith that changes were found preceding the division of the crown.

#### DIVISION OF THE CROWN.

In each of some fifty plants examined, the terminal bud of the stem formed an inflorescence. In six specimens, before the elongation of the inflorescence axis, the central cells in the spongy pith of the crown had broken down and the cavity was isolated by a cork cambium. A secondary cambium was also found in the pith adjoining the protoxylem. This structure is illustrated in plate I, fig. 3. Sections taken at a lower level showed this cambium as a continuous ring. In some twenty specimens of the same age, deposits which were golden brown or crimson in colour were found in the pith of the crown: they occurred when there was no external evidence of injury. The deposits gave the reactions characteristic of a gum: when heated with hydrochloric acid, a trace of orcin added, and the substance again heated, subsequent addition of ferric chloride gave a dark green colour. Cells containing the gum were isolated by meristematic cells, and as in the specimens already described, two concentric cylinders of cambium were found. The inner, secondary cambium cut off a small amount of xylem on the side adjoining the original xylem, and towards the inside of the stem, a large amount of secondary phloem. The secondary cambium was seen in sections taken at a lower level to join the original one at several points, thus isolating a number of separate xylem masses. By the continued activity of the cambia a number of secondary steles were formed. This is seen in diagram 5, Figure 11. Cork cambia developed in the secondary phloem led to the complete isolation and separation of the secondary steles through a certain length of the stem and root.

In those plants where no break-down of the pith or deposits of gum were found before the time of flowering, branching of the crown appeared to follow the decay of the terminal inflorescence axis. The decay at the base of the axis spread downward, affecting some of the central cells of the pith of the stem and central vessels of the root, sometimes for a considerable distance. Branching initiated by the decay of the terminal inflorescence axis has been described by Fritsché (1914) for *Taraxacum*. In this method of branching the decayed tissue was isolated by cork and secondary cambia formed within the xylem cylinder as in the plants described above.

In all plants in which they were formed, the activity of the secondary cambia in the isolation of separate steles led to the

production of a number of apparently short "branches" terminating in new rosettes and arising from the main root. A study of the development of these "branches" showed that they originated by a splitting which extended downwards from the apex of the stem. In structure the "branches" closely resembled roots unless only two or three were developed when the steles were flattened in transverse section. This is shown in diagram 4, Figure 11, which also illustrates the irregular course of the cambium frequently seen.

In plants six to seven years old, a high degree of separation of the roots was reached and it was sometimes found that the divisions of the root corresponded to the number of new crowns developed. Such crowns had strands of vascular tissue which could be traced a considerable distance along the root and even throughout its length. Not infrequently in these plants some crowns separated completely and grew as new individuals. In other plants, divisions of the root were complicated by the formation of cambia which isolated deposits of gum. Such cambia are seen in the transverse sections of roots shown in plate I, fig. 4, and in diagram 3, Figure 11. The cambia often took very irregular lines leading to numerous irregular divisions. Separation might be complete for only a short distance and the plant then seemed to show "branch roots" fusing at a lower level with the root of their origin. Further, a true fusion of roots was also observed, which took place in a way similar to that described by Millner (1932) in *Hedera Helix*.

#### CONCLUDING REMARKS.

A number of biotypes of *Taraxacum* which are morphologically distinct show a considerable plasticity in habit and leaf form, being influenced by factors affected by age, the supply of food, light and moisture. The effect of age was seen in the succession of leaves developed by biotypes grown from seed in the open. In two apomicts the three or four entire leaves produced by the seedling in spring were succeeded by deeply lobed leaves which were formed throughout the year. During the second growing season these plants, like those of three other biotypes, showed a succession of leaf forms: the lobed leaves found in early spring were replaced by a non-dissected type after flowering, while in the autumn a lobed leaf again appeared. In three other biotypes a slightly different sequence obtained, the autumn leaves remained entire. During the third and fourth growing seasons, in six biotypes the leaf pattern of the second year was repeated, although in the older plants the leaves were less regularly lobed and they were carried in an erect or sub-erect position in contrast to the flattened position often taken by the leaves of younger plants. The leaves developed following the complete removal of the crown showed a similar but slower sequence of forms. The same slow sequence was found in the ramets obtained by cloning an old plant.

Ramets grown from small pieces of root and having only a limited food supply developed leaves indistinguishable from those

of well nourished plants. Experiments with culture solutions suggest that the elements nitrogen and possibly calcium are necessary for the development of the lobed leaves characteristic of a particular biotype.

Light was shown to influence leaf form and the number of leaves developed by a plant very considerably. For two apomicts, plants grown in the shade for six to eight months formed only a small number of entire leaves, while plants of the same age grown in the sun developed a much larger number of deeply lobed leaves. The shade plants later formed leaves showing some degree of dissection: the sequence characteristic for sun plants of these apomicts is seen to be delayed and modified in shade conditions.

Water supply also affects leaf shape. In an apomict having normally a lobed leaf, plants grown in the shade but kept dry formed shorter more dissected leaves than the control plants. Growth in the shade and a saturated atmosphere for twelve months resulted in the formation of only entire leaves.

Experiments designed to test the influence of growth hormones showed that the substances  $\alpha$  naphthaline acetic acid,  $\beta$  indole acetic acid and  $\beta$  indole butyric acid, when sprayed by an atomiser over the young leaves of seedlings or applied in lanoline paste to the growing points, did not affect leaf form, although they affected the general vigour of the plant. An attempt to detect a growth substance by a chemical colour test in extracts of plants produced negative results.

A study of the development of the leaves showed that the lobed leaf characteristic of a particular biotype is laid down at an early stage in the development of the rosette. The further growth of the young leaf at the lobes is accompanied by cell division: measurements of epidermal and palisade cells at sinus and lobe showed that the cells were of the same dimensions in these two regions.

The vein islets of the leaves were examined. The number of islets in a unit area of leaf blade was found to be very variable in any one biotype and the number was not correlated with the leaf shape.

Anatomically the leaf structure is that of a typical dorsiventral leaf. Leaves from plants grown in the sun had two rows of palisade cells, sometimes irregularly arranged and only slightly elongated in a direction at right angles to the blade. The stomata on both upper and lower epidermis were slightly raised. Oil drops collected in the cells of the mesophyll when the leaf was exposed to conditions favourable for photosynthesis. No significant anatomical differences were found in the lobed and entire leaves.

The root develops a relatively small central xylem cylinder and a large amount of secondary phloem. In the latter, consisting of parenchyma and groups of laticiferous vessels and sieve tubes arranged regularly in concentric circles, the numerous narrow sieve tubes were most readily distinguished by maceration or in sections of material collected in the autumn when callose was deposited on the sieve plates of the end walls.

The stem in normally grown plants is very short : long vertical underground stems may be formed from adventitious buds when roots are left deeply buried in the ground. The anatomical structure of these stems was that of a typical Dicotyledonous plant. Laticiferous vessels occurred at the periphery of the protophloem and in the secondary phloem in close proximity to the narrow sieve tubes. The structure of the stem immediately below the crown was complicated by the large overlapping leaf bases.

Division of the crown is connected with the development of cambium within the xylem cylinder. The arcs of secondary cambium rejoined the original cambium at a lower level in the crown, thus causing the isolation of separate xylem masses. This sometimes occurred before the elongation of the terminal inflorescence axis and in such plants there was degeneration of the spongy pith at the apex of the crown or there were found to be deposits of gum in the pith or in some of the first-formed xylem vessels. In other plants, division of the crown followed the decay of the inflorescence axis : the decayed tissue at the apex of the stem was isolated by cork and secondary cambia developed as before. The development of such secondary cambia led to the isolation of secondary steles and these became completely separated by the formation of cork in the secondary phloem. The separation was sometimes complete throughout the plant : in many plants, however, division was only partial and was complicated by the formation of cambia in relation to deposits of gum.

## APPENDIX

### ORIGIN OF MATERIAL OF BIOTYPES USED IN THE PRESENT PAPER.

**Z.73.**—Grown from seed collected near Stromness War Memorial, Stromness, Mainland, Orkney, 10.10.1931, Col. H. H. Johnston. The material used was grown from seed from one flowering head of one plant of the original row of plants grown at Kew. This head in the young condition had the corollas and stamens removed by a transverse razor cut before the capitulum opened. The seeds set apomictically and the plants raised were uniform at all stages of development when grown under the same conditions. All the plants used in this paper and quoted under Z.73 were therefore proved apomicts.

**Z.145.**—Original plant collected on Potterne Fields, Potterne, Wiltshire, 26.1.1932, E. M. Marsden-Jones and W. B. Turrill. The material used was grown from seed from one head of the original plant transplanted to Kew. All the plants were obtained apomictically in the same way as for Z.73.

**Z.179.**—Grown from seed of one capitulum collected near Ible, Derbyshire, 8.8.1933, W. B. Turrill.

**Z.190.**—Grown from seed collected on Athos Peninsula, Greece, near Chilandari, 22.4.1934, W. B. Turrill.



Z.191.—Grown from seed collected on Athos Peninsula, Greece, between Kapsokalivia and Lavra, 19.4.1934, W. B. Turrill.

Z.193.—Grown from seed collected on Athos Peninsula, Greece, above Zographu Arsenal, 16.4.1934, W. B. Turrill.

Z.194.—Grown from seed collected on Athos Peninsula, Greece, near Vatopedion, 21.4.1934, W. B. Turrill.

Z.196.—Grown from seed collected on Athos Peninsula, Greece, between Simopetra and Karyes, 13.4.1934, W. B. Turrill.

Z.199. Grown from seed collected by Xerxes Canal, at the north-west end of Athos Peninsula, Greece, 17.4.1934, W. B. Turrill.

Z.200.—Grown from seed collected on Athos Peninsula, Greece, near Stavronikita, 21.4.1934, W. B. Turrill.

Z.208.—Grown from seed collected from one capitulum, north of Aberdeen, on more or less stabilized sand-dunes, 7.9.1934, W. B. Turrill.

Z.224.—Grown from seed collected on Pepeljak, North Macedonia, 10.6.1935, Mrs. H. P. Thompson.

Z.257.—Grown from seed collected by the Pjorsa river, Holt, South Iceland, 22.6.1936, J. C. W. Greene.

Z.282.—Grown from seed collected at Kineton Thorns, east Gloucestershire, 25.5.36, E. Milne-Redhead.

Z.291.—Grown from seed collected on Chailey Common, Sussex, in a damp place in heathland verging towards grassland, 17.5.36, E. Milne-Redhead.

Z.301.—Grown from seed collected near Loch Ine, west Cork, Ireland, 14.8.1936, W. B. Turrill.

Specimens of all the above are preserved in the Herbarium, Royal Botanic Gardens, Kew.

Z.73 and Z.145 are apomicts of the section *Vulgaria*. Z.179, Z.208, Z.224, Z.257, and Z.301 are biotypes, and probably also apomicts, of the section *Vulgaria*. Z. 291 is a biotype of the section *Spectabilia*. Z.190, Z.191, Z.194, Z.196, and Z.200 are biotypes of *T. Hoppeanum* Griseb. et Schenk. Z.193 and Z.199 are biotypes of *T. megalorrhizon* (Forsk.) Hand-Mazz. Z.282 is a biotype of *T. laevigatum* (Willd.) DC.

#### ACKNOWLEDGMENTS.

I should like to express my sincere thanks to Dr. Turrill for suggesting the problem and for his continued help during the research; and to Dr. Metcalfe for his help and the facilities that he has given me in the Jodrell Laboratory.

I should also like to thank Mr. G. Atkinson for photograph 1 and Mr. G. Robinson for photographs 2, 3 and 4, Plate I.

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## II—NOTES ON FERNS AND FERN ALLIES: II.

F. BALLARD.

**Adiantum Lüddemannianum** Moore in The Florist, 1876, 93 (not Veitch Cat. 1878 as stated in C. Chr. Ind. Fil.). A plant of garden origin, it is said to have arisen spontaneously in a French nursery. Its relationships are obscure. Originally stated to be a hybrid between *A. cuneatum* L. & F. and *A. Moritzianum* Link, it was considered a variety of *A. cuneatum* by Schneider and of *A. Capillus-Veneris* L. by Moore. The freakish appearance of the plant with its crispate-tasselled fronds suggests that it is a sport of a kind familiar enough in some other genera, though uncommon in *Adiantum*. It was first described by Carrière as *A. cristatum* in Rev. Hort. **46**,

228 (1874). Although bearing sori the plant is apparently quite sterile.

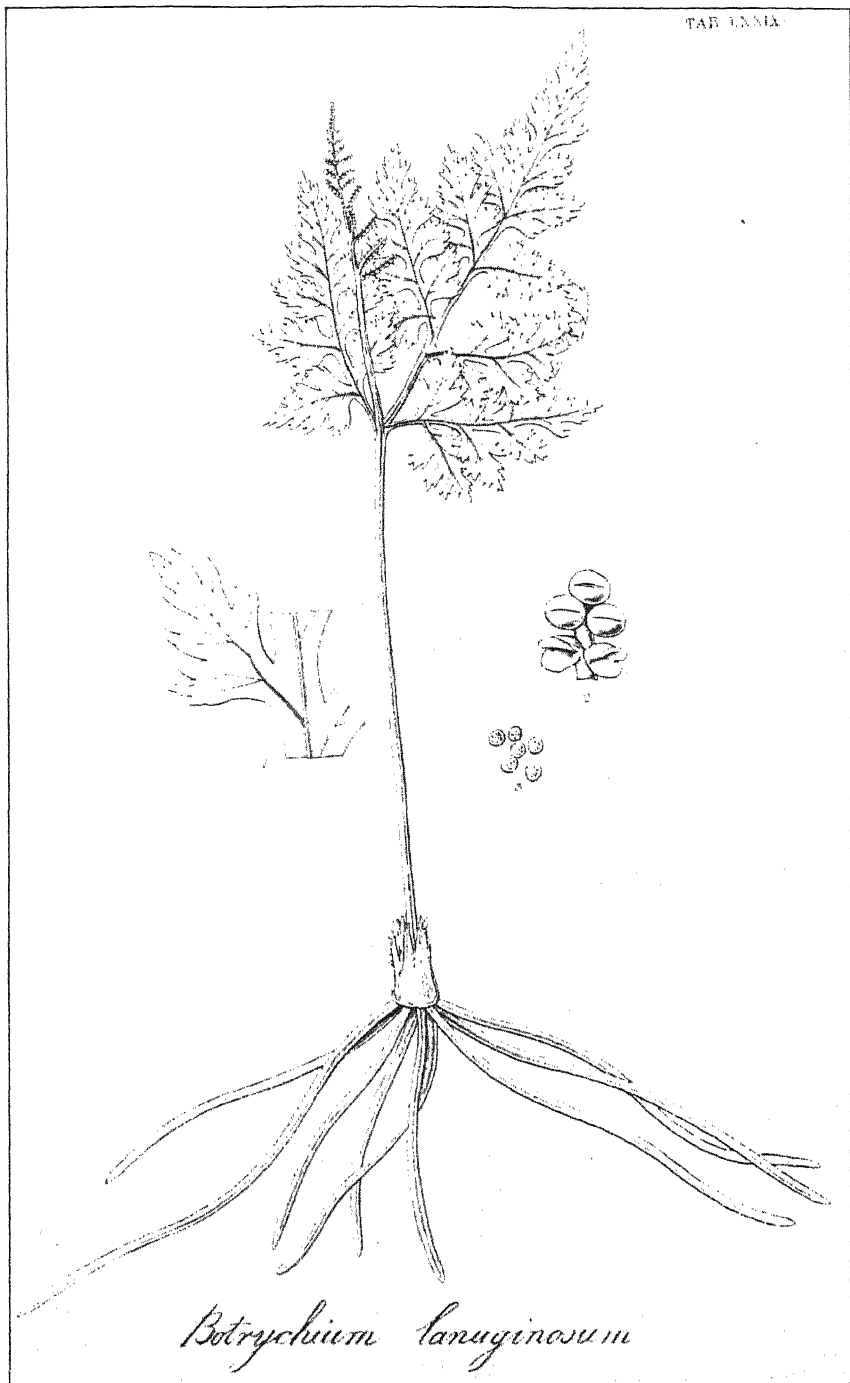
***Adiantum patens* Willd. var. *Oatesii* (Bak.) Ballard, stat. nov.** *A. Oatesii* Bak. in Oates, Matabeleland, App. V, 369, c. ic. (1881). This plant resembles the tropical American *A. patens* closely and is distinguished only by the soft thin texture and pale green colour of its fronds. Baker believed it to be related to *A. pedatum* L. and this is understandable in view of the sterile incomplete frond that constitutes the type material. The variety has been found in the Bauchi Plateau of Northern Nigeria, Southern Tanganyika Territory, and north western and southern Rhodesia. In Northern Rhodesia the plant grows sometimes on termite hills.

***Arthropteris orientalis* (Gmel.) O. Posth. var. *punctulata* (Bak.) Ballard, comb. nov.** *Nephrodium punctulatum* Bak. Syn. Fil. 261 (1867). *Dryopteris orientalis* (Gmel.) C. Chr. var. *punctulata* (Bak.) C. Chr. This is a well-marked variety confined to the Cameroons.

***Botrychium lanuginosum* Wall. ex Hook. & Grev.** The name *Botrychium lanuginosum* first appeared in Wallich's Catalogue of 1828 and was thus a *nomen nudum*. Hooker and Greville a little later, in 1828 or 1829, in their *Icones Filicum*, 1, t. 79, published a plate of the species prepared from material supplied by Wallich. A description accompanied the plate and the species was thus validated.

The figure drawn by Greville, however, depicts a small plant very different in appearance from the modern concept of *B. lanuginosum* (see Plate II). A character which serves to distinguish this species from all other *Botrychia* is the unusual position of the fertile spike. It arises laterally from the main rachis in a position which, although it tends to vary from plant to plant, is always situated above the base of the blade. So significant has this feature been regarded by some workers that Clausen in his recent revision of the *Ophioglossaceae* (Mem. Torr. Bot. Club, 19, no. 2 : 1938) has proposed a new section, the *Lanuginosae*, for the species. The Greville plate portrays a fertile spike arising from the base of the blade, coincident with the attachment of the two lowest pinnae. The general effect somewhat resembles *B. virginianum* and suspicions were aroused as to the actual identity of the plant figured. Efforts were made to locate the specimen, which was absent from the Hooker collections at Kew, and it was eventually discovered in the Greville herbarium at Edinburgh. A single sheet of the species contains two specimens, both purporting to represent Wallich's No. 48. One is a complete plant and bears little resemblance to Greville's drawing; the other consists of a blade only and is undoubtedly the plant from which the upper part of Greville's drawing was prepared. The unusually small size of the blade and the apparent insertion of the fertile spike at the base were at first sight somewhat puzzling. A

TAB. LXXXIX



*Botrychium lanuginosum*



careful examination of the fertile spike, however, revealed the fact that the insertion was not at the base of the blade but at a point on the rachis about half an inch below it. The true state of affairs then became apparent. The natural assumption had been that the specimen represented a complete blade, whereas in reality only the uppermost portion, including the fertile spike, was present, the lower pinnae being missing.

One has to conclude, therefore, that in order to produce a drawing of a size convenient for reproduction, Greville combined, quite innocently, the incomplete frond just described with the basal portion of another specimen.

It seems strange that neither Hooker nor Greville attached any importance to the unusual position of the fertile spike. The point of insertion is not mentioned in the text accompanying the plate, although the authors admit having seen several specimens.

*Dryopteris Wilsoni* (Bak.) C. Chr. This was described by Baker as *Nephrodium Wilsoni* in Ann. Bot. **5**, 321 (1891) from an incomplete frond collected in Uganda near the shores of the Victoria Nyanza. The specimen is undoubtedly a large frond of *Arthropteris orientalis* (Gmel.) Posth., although so little stipe is present that the articulation is missing. There are, however, obscure traces of lime-spots, a feature which is so characteristic of this species.

*Polypodium Schneideri* G. Schneider. This fern was raised in the late Messrs. Veitch's Chelsea nursery by G. Schneider and was claimed to be a hybrid between *P. aureum* L. and *P. vulgare* L. var. *elegantissimum*. The crossing was successfully repeated several times by Schneider, and Prof. J. B. Farmer, who investigated the structure of the hybrid (Ann. Bot. **11**, 533: 1897), was satisfied of the validity of Schneider's claim. A description of the plant appeared in Schneider's "Book of Choice Ferns," **3**, 209 (1894) accompanied by a picture (p. 210). Christensen's reference in his Index Filicum (p. 562) is to a *nomen nudum*. In 1898, H. Christ described (Bull. Herb. Boiss. **6**, 835) a Sumatran plant as *P. Schneideri*, a name which is illegitimate according to the Rules of Nomenclature and for which another name has to be found. Since, however, it seems possible that the species is identical with *P. longissimum* Bl., no new name is proposed here.

### III—PLANTS NEW TO ASSAM: XI.\* C. E. C. FISCHER.

*Corydalis Borii* C. E. C. Fischer, sp. nov. [Fumariaceae]; *C. Chanetii* Lév. proxima, sed foliis haud longe petiolatis, pinnis utrinque 3-4, bracteis integris, sepalis haud cordatis, floribus majoribus differt.

Annual (?) glabrous herb. Leaves: basal not seen; cauline several, sessile or nearly so, ovate in outline, 4-14 cm. long, 2-10 cm.

\* Continued from K.B. 1938, 213.

wide, pale below, pinnatisect, lobes 3-4 on each side, more or less decurrent on the midrib, elliptic, the terminal lanceolate, lobulate the lobules unequally 2-4-toothed, teeth acute or rounded. *Inflorescence* of terminal or terminal and lateral, few- to many-flowered racemes, 4-6 cm. long in flower, up to 17 cm. long in fruit, the lateral usually shorter; peduncles short; bracts lanceolate from a broad base which embraces the base of the pedicel, acute, 4-5 mm. long; pedicels 2.5-3 mm. long, lengthening in fruit. *Sepals* subcircular or broader than long, 0.75-1 mm. long, 1-1.5 mm. wide, delicate, erose-denticulate. *Corolla* including the spur 2.2-2.5 cm. long; *anterior petal* oblanceolate, obtuse, more or less boat-shaped, 9-10 mm. long; *posterior* cucullate, 8-9 mm. long with a nearly straight spur 1.4-1.5 cm. long; 2 *interior* oblong, obtuse, 5-5.5 mm. long, 2.5 mm. wide, cohering by their apices and joined at the base to the sides of the posterior petal, winged on the back along the midnerve and with a thick, broadly conical wing or fold along the lower  $\frac{2}{3}$  of one of the lateral nerves. *Ovary* narrowly fusiform, 4-5 mm. long; ovules 8-10. *Capsules* (mature?) narrowly oblanceolate, 9-13 mm. long, 8-10 seeded.

NAGA HILLS: Chingku, 2400 m., fls. & frt. Dec., *N. L. Bor.* 6785 (type in Kew Herb.), "gregarious in oak forest"; Thekubama, 2100 m., fls. & frt. June, *Bor* 4456, "gregarious in deep evergreen forest, fls. orange-brown"; Pulebudze, 1500 m., fls. & frt. Aug., *Bor* 6349, "fls. orange."

***Hypericum gracilipes*** Stapf ex C. E. C. Fischer, sp. nov. [Hypericaceae]; *H. Uralum* Ham. ex D. Don peraffinis, ramulis teretibus, venis foliorum supra impressis, bracteis anguste lanceolatis caudato-acuminatis, sepalis lanceolatis, stigmatibus capitellato differt.

A glabrous, branched *undershrub*; branchlets terete, brown. *Leaves* decussate, lanceolate to narrowly ovate, acute or subacute at both ends, 1.8-3.7 cm. long, 0.6-2 cm. wide, midrib and 3 pairs of primary nerves arising below the middle impressed above, slightly prominent below, the nerves inarching and anastomosing near the margins, secondary nerves and reticulations obscure, brown when dry, opaque so that the glands are inconspicuous; petioles 0 or very short. *Cymes* dichotomous, terminating the branchlets, up to 7-flowered; peduncle about 1 cm. long; bracts linear-lanceolate, caudate, up to 1.3 cm. long; bracteoles similar, shorter. *Sepals* 5, coriaceous, narrowly lanceolate, 8-8.5 mm. long, 1.8-2.2 mm. wide, subacute. *Petals* 5, broadly obovate to subrotund, slightly oblique, up to 1.6 cm. long and 1.4 cm. wide, apex rounded, yellow, thinly membranous with one margin subcoriaceous. *Stamens* numerous, in 5 bundles; filaments unequal, shorter than the petals. *Ovary* ellipsoid, 6 mm. long, 5-celled; ovules axile; styles 5, 5 mm. long, slender; stigmas capitate. *Capsule* 1 cm. long.

LUSHAI HILLS: Neikdawn, on banks of stream, 1200 m., fls. & frt. July, *Mrs. N. E. Parry* 74 (type in Kew Herb.). NAGA HILLS: Kedima, on a sandstone slope, 1800 m., fls. July, *Bor* 6313.

Dr. O. Stapf had set Mrs. Parry's specimen aside as a new species to which he proposed to give the binomial adopted.

**Ophiorrhiza tingens** C. B. Clark ex C. E. C. Fischer, sp. nov. [Rubiaceae]; *O. Mungos* Linn. accedens, stipulis multo longioribus, bracteolis persistentibus, capsulis minoribus differt.

An *undershrub* up to 30 cm. high (sometimes trailing and longer); stems terete, woody and glabrous below, simple or branched and more or less brown-puberulous above. *Leaves* lanceolate to ovate, rarely subrotund, acute to caudate-acuminate, tapered to the base and more or less decurrent, 9–17 cm. long, 3–6 cm. wide, glabrous above or with scattered very short hairs, more or less puberulous on the midrib and nerves below, midrib prominent below, primary nerves 10–14 pairs, slightly raised below, slightly arched, parallel, anastomosing near the margins, when dry usually dark-brown or olivaceous above, pale and often reddish below; petioles 1–4 cm. long, brown-pubescent or glabrescent; stipules narrowly ensiform, up to 1 cm. long, entire or more or less deeply 2-fid, apices filiform. *Inflorescence* terminal, 1.5–3 cm. long, lengthening in fruit, peduncles 1.5–7 cm. long, more or less densely brown-pubescent, bracts and bracteoles persistent, linear, up to 6 mm. long. *Calyx-tube* funnel-shaped, 1 mm. long, brown-puberulous; lobes 5, lanceolate to ovate, acute, 0.2 mm. long. *Corolla-tube* cylindric, 4.5–8.5 mm. long, villous within just below the mouth; lobes 5, oblong lanceolate, obtuse, 2–2.5 mm. long, puberulous within. *Stamens* 5, inserted at about the middle of the corolla-tube or close to the base; filaments 0.5–1.5 mm. long; anthers linear 1.6–2.3 mm. long. *Disk* of 2 fleshy, oblate, curved segments 0.5–1 mm. long, 1.5 mm. wide. *Style* slender, shorter than the longer stamens and included or up to 8.3 mm. long and shortly exserted, barbellate; stigma flat, expanded, entire or bifid. *Capsules* 2–2.5 mm. long, 4.5–8 mm. wide.

NAGA HILLS: Kohima, 1800 m., fls. purplish, Oct., C. B. Clarke 41121 A (type in Kew Herb.); Kohima, 1260 m., fls. purple, May, D. Prain s.n.; Tesangki, 1200 m., fls. white pink outside, May, Bor 2654; Benronmi, 1450 m., fls. white and frt. May, Bor 2669; Paona, 2500 m., fls. white and purple, end April, Bor 2751; Tesangki, 1450 m., fls. end April, Bor 2782; Konoma, 1700 m., fls. April, King's Collector 246. NOWGONG, Simons s. n.; Jenkins 4842. GARO HILLS; Simons s. n. KHASIA: Burney Hut, 180 m., fls. nearly white, May, Clarke 38076 A; Nungpo, 540 m., fls. lurid-purplish, early April, Clarke 43268. BURMA: S. Mines, towards Kuwa, Boon, fls. May, Griffith Kew Distr. No. 2865.

Heterostyly seems to occur in this species, but more research in the field is necessary to establish the point.

C. B. Clarke recognised all the specimens listed above except those of Dr. N. L. Bor's as a new species and inscribed them with the combination accepted.



**Ophiorrhiza Wattii** C. E. C. Fischer, sp. nov. [Rubiaceae]; *O. cantonensis* Hance peraffinis, foliis apice basique sensim attenuatis, bracteolis longioribus latioribusque, corollis longioribus differt.

An undershrub up to 30 cm. high, unbranched in specimens seen; stem woody below, sulcate when dry. *Leaves* elliptic or elliptic-lanceolate, caudate, tapering to the base, 6–16.5 cm. long, 2.4–4.5 cm. wide, midrib impressed above, primary nerves 10–11 pairs, arched, parallel and joining the next above near the margin, a very fine vein running along the margin interrupted by a series of glands, dark above when dry, paler below, with scattered minute hairs on both faces especially near the margins and on the nerves, hardly visible without a lens; petioles slender, 1–3.5 cm. long; stipules not seen. *Inflorescence* terminal; peduncles 1.5–2.5 cm. long, with 2 lines of rufous pubescence; branchlets short, rufous-puberulous; bracts and bracteoles linear-lorate, finely acuminate, 4–12 mm. long; pedicels 1–2 mm. long, rufous-puberulous. *Calyx-tube* cupular, 1.5 mm. long, rufous-puberulous; lobes 5, ensiform, 1.5–2 mm. long. *Corolla-tube* cylindric, 1.3 cm. long, pubescent on the middle third within; lobes 5, oblong, rounded, 2 mm. long. *Stamens* 5, inserted about the middle of the corolla-tube; filaments slender, 3–4 mm. long; anthers basifixed, linear, 3.5 mm. long. *Disk* of 2 quadrate or trapezoid, fleshy, lobiculate segments 1–2 mm. long. *Style* slender, 3–4 mm. long; stigma ellipsoid, flat, 2.5–3.5 mm. long, entire or more or less deeply bifid. *Capsule* 2.5 mm. long, 6 mm. wide.

MANIPUR: in the forest around Siharifuror, 1800 m., fls. and frt. April, *G. Watt* 6350 (type in Kew Herb.). NAGA HILLS: Shiloi Jopi, gregarious in oak forest at 2500 m. fls. white, Sept., *Bor* 6750. Watt recognised his specimen as a new species but did not publish a description; as the combination he proposed has since been used I have dedicated the species to him.

**Tarennia Borii** C. E. C. Fischer, sp. nov. [Rubiaceae]; *T. asiaticae* (Linn.) O. Ktze. affinis, foliis membranaceis, corymbis floribusque majoribus, pedicellis multo longioribus distincta.

A small, glabrous tree; ultimate twigs terete, grey-brown. *Leaves* lanceolate- or ovate-oblong, acuminate, base rounded or cuneate, 9–12 cm. long, 3.5–5.5 cm. wide, primary nerves 7–10 pairs, prominent below, glabrous except for a small group of hairs in each of the axils below; petioles 0.4–2.3 cm. long; stipules ensiform from a broad base, 6–7 mm. long, deciduous. *Corymbs* terminal with a few smaller from the upper axils, up to 6 cm. across; peduncles short; bracteoles 2 at the base of the pedicels, shortly united at the base, ovate, cuspidate, 2 mm. long; pedicels slender, 6–10 mm. long, black when dry. *Calyx* turbinate, 6–6.5 mm. long including the ovary; lobes 5, cuspidate, keeled at the apex, 2 mm. long, 3 mm. wide, margins sometimes minutely bristle-ciliate. *Corolla* hypocrateriform; tube cylindric, 6–8.5 mm. long, hairy within with pale-brown, crisped hairs; lobes 5, overlapping

clockwise, broadly oblong, often with a blunt tooth on one or both sides near the apex, 8.5–11 mm. long, 5–6 mm. wide. *Stamens* 5; anthers sessile on and partly exserted from the naked mouth of the corolla, 6–7 mm. long. *Ovary* 3.5–4 mm. long; ovules  $\infty$ ; style rather stout, 7–8 mm. long; stigma exserted, fusiform, 5 mm. long, 1.5 mm. diam. *Fruit* not seen.

NAGA HILLS: Tesangki, 1625 m., fls. white, May, *Bor* 2653 (type in Kew Herb.); *Bor* 2644, without particulars, in Dehra Dun Herb.

***Patrinia pentandra*** C. E. C. Fischer, sp. nov. [Valerianaceae]; *P. monandrae* C. B. Clarke similis, caulibus fistulosis, foliis sessilibus, staminibus quinque differt.

A tall *herb*; stem fistular, pale-brown, 6–7 mm. diam. *Leaves* sessile, pinnatisect nearly to the midrib, lobes 2–3 pairs and a terminal, the lowest pair very short, linear, entire, the next two narrowly elliptic-lanceolate or oblanceolate, acute, 2.5–3.5 cm. long, 5–8 mm. wide, margins 2–3-toothed on each side, terminal lobe elliptic, acute at both ends, 8–11 cm. long, 3–4 cm. wide, coarsely, regularly toothed, primary nerves of lateral lobes 3 from the base, of the terminal 6–7 pairs, ultimate reticulations of all fine, glabrous or nearly so above, sparsely pubescent on the nerves below, ciliolate; stipular ridge pubescent. *Panicles* terminal and axillary, the terminal up to 30 cm. long; rhachis and its branches pubescent on one side; floral leaves at the divisions like the cauline but smaller; bracts linear, obtuse, 1.7–2.7 mm. long; bracteoles 2 under the flower, subcircular, 2 mm. diam., serrulate. *Flowers* numerous, sessile. *Ovary* narrowly turbinate, 1.5 mm. long, puberulous, 3-celled. *Calyx* a mere, very short, entire rim. *Corolla* cupular; tube 2.2 mm. long, villous within; lobes 5, semicircular or oblong, 1.5 mm. long. *Stamens* 5, on the base of the corolla; filaments 1.5 mm. long, glabrous or villous in the same flower; anthers oblong, 0.6 mm. long, reddish, appressed-pubescent. *Style* slender, 2.5 mm. long, glabrous; stigma capitate. *Fruit* ellipsoid, 3-gonous, crustaceous, 3 mm. long, hispidulous on the angles and the back, subequally 3-celled, posterior cell 1-seeded, the anterior 2 empty; bract attached to the fruit papery, oblong or subcircular, strongly veined, 6.5–7.5 mm. long, 4–5.5 mm. wide.

NAGA HILLS: Lacham, 1100 m., fls. yellow and white, Sept., *N.L. Bor* 6733 (type in Kew Herb.). MANIPUR: Moa, frt. Oct., C. B. Clarke 41423A.

***Myriactis assamensis*** C. E. C. Fischer, sp. nov. [Compositae]; ab omnibus ceteris speciebus foliis minoribus angustis differt.

A much-branched *herb* 10–25 cm. high; stems numerous from the base, glabrous below, dark-grey, sulcate. *Leaves* alternate, sessile, linear to linear-oblanceolate, acute, slightly narrowed to a semi-amplexicaul base, 1.5–2.7 cm. long, 2–3 mm. wide, margins entire or with an acute tooth on both sides a little below the apex

and often another pair lower down but above the middle, midrib slightly impressed above, slightly prominent below, lateral nerves obscure. *Capitula* solitary, terminating the branchlets, hemispheric, 3–4 mm. diam.; peduncles slender, up to 7 cm. long, hispidulous, bearing a few reduced leaves which become smaller upwards. *Phyllaries* 2-ranked, thinly membranous, oblong, obtuse, minutely denticulate, 2–3 mm. long, the inner the larger, when dry olivaceous and minutely puberulous with pale scarious minutely ciliolate margins. *Receptacle* flat naked. *Ray florets* 2–3-seriate; *ovary* linear to elliptic-ob lanceolate and compressed, narrowed at both ends, 1.5–2 mm. long, glandular; *ligules* linear, obtuse, 7–8 mm. long, white; *style* short, shortly, bluntly 2-fid. *Disk florets* many, tubular, 2–2.5 mm. long; *ovary* as in the ray florets; *corolla* abruptly funnel-shaped above a short cylindric base, 2–2.5 mm. long, yellow; lobes 4–5, triangular, acute, about half the length of the tube; *stamens* 4–5, anthers short, oblong, apiculate; *style* deeply 2-fid, lobes linear lanceolate, acute, minutely papillose outside. *Achenes* very narrowly oblanceolate, compressed, 3 mm. long, including a very short beak, dark-brown, glandular.

NAGA HILLS: Nahatomi, on rocks in Tizu River, 900 m. fls. Dept., Bor 6692 (type in Kew Herb.). GARO HILLS: Nongwalbibra, among rocks in Somesiwari River, 725 m., fls. & frt. early Jan., Mrs. N. E. Parry 1229, Garo name: *Rongbikal*.

**Saussurea nagensis** C. E. C. Fischer, sp. nov. [Compositae]; *S. deltoideae* (DC.) C. B. Clarke peraffinis, lobis terminalibus foliorum anguste lanceolatis, phyllariis basi valde incrassatis concavis distincta.

A tall *undershrub*; stem more or less woody below, terete, sulcate, reddish and thinly cottony above (lower parts not seen). *Leaves* stiffly membranous, ovate in outline, acuminate, deeply pinnatisect, often to very near the midrib, 20–23 cm. long, 13–16 cm. wide, lobes 3–4 pairs with sometimes a very small detached pair below, lanceolate, acuminate, apiculate, margins, as also those of the long linear-lanceolate terminal lobe, sinuate-dentate with large and small apiculate teeth, the 2nd pair from the base the largest of the lateral lobes, midrib prominent on both faces, lateral nerves more or less prominent below; upper surface dark-green, densely dotted with short, brown, crisped hairs, below grey-floccose, brownish on the nerves, basal lobes narrowly decurrent on the 2–3 cm. long, flocculent petiole, usually subtended by a small auricle. *Inflorescence* terminal, paniced, up to 30 cm. long, lateral branches racemose, up to 10 cm. long, 1–4-capitulate; peduncles of solitary or terminal capitula up to 6.5 cm. long, of the rest 2–10 mm. long; rhachis, its branches and the peduncles thinly tomentose; bracts at the divisions of the rhachis and base of the peduncles linear-lanceolate to linear, up to 5 cm. long, the lower largest, more or less coarsely and sharply dentate, the upper much smaller and entire, indumentum as of the leaves. *Capitula* hemispheric, up

to 2 cm. diam.; phyllaries 6-seriate, 8.5-9.5 mm. long, the outer ensiform from a broad, much thickened, concave base 3.5 mm. diam., apiculate, cottony below, the upper part shortly dark-hairy, the inner bracts shorter and narrower with less thickened bases, the outer 2-3 rows recurved; receptacle flat, densely furnished with yellowish setae 2.4-5.6 mm. long. *Florets* all tubular. *Ovary* oblong, compressed with one side excavate (at least when dry) or more or less trigonous in section, shallowly ribbed, 3-3.5 mm. long, apex truncate with a raised, usually denticulate rim. *Pappus* 1-seriate, united into a ring at the base, 8-11 mm. long, white, plumose. *Corolla* 1 cm. long, mauve, lower half narrow-cylindric, upper very narrowly funnel-shaped; lobes 5 linear, acute, 2.7 mm. long. *Stamens* 5, anthers 4 mm. long, their tails 2 mm. long, nearly entire. *Style* 2-fid, arms plano-convex, obtuse. *Achenes* not seen.

NAGA HILLS: Phulani, on grassy slopes, 2150 m., fls. Sept., *Bor* 27.

***Lobelia Handelii* E. Wimm.** [Campanulaceae].

Previous record from Yunnan.

NAGA HILLS: Japvo, 2900 m., fls. late Sept., *Bor* 6428.

***Symplocos Ifsiana* C. E. C. Fischer**, sp. nov. [Symplocaceae]; proxima *S. cordifoliae* Thw., ramulis tomentosis, foliis papyraceis majoribus subtus pilosis, lobis calycis ovatis, stylo villosis, fructu hirsuto distat.

A small tree; youngest twigs brownish- or fuscous-tomentose; branchlets finely furrowed, brown, glabrescent. *Leaves* papery, elliptic or elliptic-oblong, rarely elliptic-ob lanceolate, acuminate, base rounded or cuneate, the apex sometimes falcate, 10-20 cm. long, 4.5-7.5 cm. wide, midrib and 9-11 pairs of primary nerves impressed above, prominent below, the nerves anastomosing near the margins, secondary nerves scalariform, margins closely denticulate with linear teeth callous at the tip, upper surface glabrous except for the hairy midrib and usually the primary nerves also at least near their bases, below pilose on the midrib, nerves and nervules; petioles terete, 8-13 mm. long, brown- or fuscous-tomentose. *Racemes* simple, from the apical axils, 3-5 cm. long; rhachis grey- or brownish-tomentose; flowers crowded, sessile; bracts broadly ovate, obtuse 5-6 mm. long, villous without, ciliate; bracteoles similar but smaller and sometimes apiculate. *Calyx-tube* very short above the ovary; lobes 5, ovate, obtuse, densely grey-villous as is the tube without, 3.5 mm. long. *Corolla-tube* very short; lobes 5, elliptic-oblong, obtuse or subacute, pale-yellow (when dry), 8-8.5 mm. long, thinly pubescent on the lower half and on the tube without. *Stamens* 70-80; filaments slender, glabrous, 7.5-9.5 mm. long, united at the very base and adhering to the corolla-tube, not pentadelphous; anthers broadly oblong, 0.7 mm. long. *Ovary* cupular, 1.5 mm. long, densely grey-villous, 3-celled; style 7.5 mm. long, villous in the lower  $\frac{2}{3}$ . *Fruit* oblong,

1-1.15 cm. long, 5-6 mm. diam., crowned by the calyx, very dark-green (when dry), brown-hairy.

NAGA HILLS: Thevopesimi, in evergreen forest, 2170 m., fls. Sept., *Bor* 22 (type in Kew Herb.); Kamku Range, 2170., frt. March, *Bor* 2932.

The names of several Forest Officers in India have been commemorated in the names given to genera and species of Indian plants, but none have been dedicated to the Indian Forest Service (I.F.S.) as a whole and I take the liberty of doing so in this case.

**Symplocos nagensis** C. E. C. Fischer, sp. nov. [Symplocaceae]; *S. ramosissimae* Wall. affinis, ramulis hornotinis tomentosis, foliis angustioribus, costa subtus pilosa, staminibus multo numerosioribus differt.

A small tree; youngest twigs closely brown-tomentose, the older slender, dark-brown, finely furrowed (when dry), glabrous. *Leaves* elliptic to elliptic-oblong, acuminate, base cuneate, 5.5-9.2 cm. long, 2-3 cm. wide, midrib prominent below, primary nerves 7-8 pairs, above shining and glabrous except for the puberulous midrib, below dull and with scattered hairs when young, soon becoming glabrous except for the permanently hirsute midrib, margins slightly revolute, sharply serrate except for the lower  $\frac{1}{5}$ - $\frac{1}{3}$  and the apex, the teeth callous-tipped; petioles slightly compressed, 3-5 mm. long, hairy. *Racemes* from the upper axils, 2-7-flowered; peduncle 1 cm. long, densely appressed-pubescent, brownish near the base, greyish upwards; bracts ovate, 1 mm. long, pubescent outside; pedicels 2-4 mm. long, appressed grey-pubescent; bracteoles 2, opposite, at the base of the ovary, similar to the bracts. *Calyx* with ovary turbinate, 2.8 mm. long, pubescent; lobes 5, subsemicircular, 1 mm. long. *Corolla* 4 mm. long, cream-coloured; lobes 5, very shortly united at the base, broadly ovate, obtuse, glabrous. *Stamens* over 100, very slightly pentadelphous; filaments slender, up to 5 mm. long, glabrous. *Ovary* 2-celled; style 7 mm. long, glabrous. *Fruit* not seen.

NAGA HILLS: Kanjang, 2350 m., fls. Sept., *Bor* 6745.

**Wrightia sikkimensis** Gamble [Apocynaceae].

Known from Sikkim.

NAGA HILLS: Jotsoma, 1450 m., fls. May, *N. L. Bor* 6363, "Climber; flowers reddish." Though this is a climber, it is not otherwise distinguishable from the plant described by Gamble.

**Onosma Borii** C. E. C. Fischer, sp. nov. [Boraginaceae]; *O. multiramosae* Hand.-Mzt. peraffinis, cymis terminalibus et axillari-bus, calycis tubo distincto, corolla calyce satis longiore, filamentis latis, disci praesentia distat.

Erect herb; twigs pale grey-brown, setose with patent hairs from tubercular bases mixed with short adpressed bristles (lower parts not seen). Basal leaves in a rosette lying procumbent (fide N. L.

Bor); upper cauline sessile or very shortly petioled, narrowly lanceolate, acute or subacute, base rounded, 2.7-5.3 cm. long, 6-12 mm. wide, midrib impressed above, prominent below, lateral nerves 3 pairs, arising at a very acute angle, obscure, above dark-green rough with long setae from tubercular bases, which latter eventually appear as white dots, mixed with shorter ones, below greyish and harsh with long setae from tubercles on the midrib, the rest densely covered with long and short stiff hairs, margins revolute. *Cymes* dichotomous, terminal and from the upper axils, up to 4 cm. long; rhachis and its branches setose like the twigs; bracts and bracteoles like the leaves but much smaller, similarly setose; pedicels 4-10 mm. long, setose. *Calyx* cupular, setose from tubercles mixed with short appressed bristles without, densely appressed white-setose within; tube 3.2-4.5 mm. long; lobes lanceolate, acuminate, 5.5-6.5 mm. long. *Corolla* narrowly barrel-shaped; tube 1.55 cm. long, retrorsely hispid without, hairy below the stamens within; lobes triangular-ovate, obtuse, 1-1.2 mm. long. *Stamens* inserted just below the middle of the corolla; filaments flat, broad, 3.7-4 mm. long, hairy at the base; anthers included, cohering by their bases into a cone, linear-ensiform, introrse, 6 mm. long including the beak, margins and apex minutely spinulose, *Disk* annular, thinly membranous, 1.5 mm. long. *Ovary*-lobes lobulate, 1 mm. long; style slender, 1.65 cm. long, shortly exserted; stigma capitate, minute. *Fruit* not seen.

NAGA HILLS: Laruri, 1230 m. and Shiloi Jopi, 2450 m., fls. Sept., *N. L. Bor.* 39 (type in Kew Herb.). "Fls. blue changing to pink at the corolla-mouth."

***Onosma lycopsioides*** C. E. C. Fischer, sp. nov. [Boraginaceae]; *O. Borii* C. E. C. Fischer affinis, ramulis fuscis, foliis elliptico-oblongis distat.

Erect *herb* (lower parts not seen); twigs terete, dark-brown, covered with spreading whitish or brownish setae from tubercular bases mixed with shorter hairs. Upper cauline *leaves* sessile elliptic-oblong, acute, narrowed to the base, 5.5-12 cm. long, 1.3-3.5 cm. wide, lateral nerves obscure, upper surface dark-brown when dry, whitish-setose from tubercular bases which latter eventually appear as white discs, below pale and furnished with softer setae from smaller tubercles, denser on the nerves. *Cymes* terminal and from the upper axils; peduncles up to 10 cm. long, setose like the twigs, partial rhachises and pedicels; bracts like the leaves but much smaller, sometimes ovate; bracteoles at the base of the pedicels linear to linear-lanceolate, finely acuminate, sessile, 5-10 mm. long, white-setose; pedicels 5-10 mm. long. *Calyx* turbinate; tube 3.7-4 mm. long; lobes lanceolate, acute, 5.5 mm. long, patently densely white-setose from tubercular bases outside, densely appressedly white-setose within. *Corolla* barrel-shaped from a very short cylindric base 1.7 cm. long, retrorsely hispid without, glabrous within except for a zone of hairs about the

base of the stamens ; lobes ovate, obtuse, 1.5 mm. long. *Stamens* inserted about  $\frac{1}{3}$  above the base of the corolla ; filaments ensiform, 6 mm. long, brown-hirsute at the base ; anthers included, cohering by their bases, introrse, narrowly linear-lanceolate, dorsifixed, 6 mm. long including the beak, margins and apex minutely spinulose. *Disk* annular, thinly membranous, 2 mm. long, apex 8-lobulate. *Ovary* 1 mm. long ; style slender, glabrous, 1.6 mm. long, shortly exserted ; stigma capitate, minute. *Fruit* not seen.

NAGA HILLS : Japvo, 3050 m. fls. Sept., *N. L. Bor* 6507 (type in Kew Herb.) " Flowers bluish-purple."

In Kew Bull. 1938, 211, this same specimen was erroneously cited as *Lycopsis arvensis* Linn. which it closely resembles in its vegetative parts. The specimen was devoid of corollas, stamens and nutlets so that the main points of difference between the two genera were lacking. Subsequently further samples of the same collection were received and the error could then be corrected.

**Wulfenia Amherstiana** Benth. [Scrophulariaceae].

Known from the Western Himalayas from Afghanistan to Kumaon.

KHASIA AND JAINTIA HILLS : Lawlyngdoh, 1800 m., fls. Sept., *vide* Dr. N. L. Bor *in litt.* (specimens in Dehra Dun & Shillong Herbaria).

**Chirita Trailliana** Forr. et W. W. Smith [Gesneriaceae].

Recorded from W. China.

NAGA HILLS : Kilomi, 1850 m., fls. June. *N. L. Bor* 4482.

**Didymocarpus yunnanensis** (Franch.) C. E. C. Fischer, comb. nov. [Gesneriaceae]. *Rottlera yunnanensis* Franch. in Bull. Mus. Hist. Nat. Paris, 5, 250 (1899)—a Yunnan plant.

NAGA HILLS : Pulebudze, 1540 m., fls. Aug., *N. L. Bor* 6346.

**Aeschynanthus oblanceolata** (Anth.) C. E. C. Fischer, stat. nov. [Gesneriaceae] ; *A. bracteata* Wall. affinis, foliis oblanceolatis cuspidatis minoribus, bracteis minoribus, filamentis haud exsertis differt.

A glabrous epiphytic *shrub* 0.4–1.6 m. long, pendulous ; branches pale- to dark-brown, 2 mm. diam. or more, woody. Leaves oblanceolate, sometimes elliptic-oblanceolate, abruptly cuspidate, subacute, base tapered, 4–7 cm. long, 1.3–2.5 cm. wide, midrib impressed above, raised below, nerves invisible, margins more or less revolute ; petioles 6–10 mm. long canaliculate above. *Inflorescence* in the upper axils, sometimes appearing terminal through the arrest of the terminal buds ; peduncles solitary or twin, 3–6 cm. long, 1–2-flowered, with minute, thick, broadly ovate, apiculate bracts at the base ; bracteoles ovate or ovate-lanceolate, obtuse or subacute, 1–1.6 cm. long ; pedicels 0.5–2 cm. long. *Sepals* 5, narrowly oblong, obtuse or subacute, 1.4–2 cm. long. *Corolla* tubular, curved, slightly ventricose ; tube 3.2–3.5 cm. long ; limb 2-lipped, posterior lip of 2 broadly oblong, rounded lobes 3–4 mm.

long, anterior 3-lobes, lobes broadly oblong, 4-6 mm. long, midlobe longest. *Stamens* 4; filaments slender, 1.3-1.6 cm. long, puberulous towards the apex, inserted about the middle of the corolla-tube, those of the anterior a little lower than the posterior and a little longer; anthers oblong, 2-2.5 mm. long, united in pairs by their apices in the corolla-mouth. *Disk* annular, lobulate, 2 mm. long. *Ovary* stipitate; stipe 1.2-1.6 cm. long; carpel linear, 1.1-1.3 cm. long; style 4-5 mm. long; stigma widely funnel-shaped. *Fruit* and *seeds* not seen.

NAGA HILLS: Pulebudze, 2530 m., fls. Aug., *N. L. Bor* 6345, "flowers plum-coloured, mouth spotted." N. E. Burma: "on rocks and trees in mixed forests," 2530-2900 m., fls. Sept. *G. Forrest* 24935 (type in Edin. Herb., duplicate in Kew Herb.) "pendulous epiphytic plant of 1-2 ft.; flowers brilliant scarlet-crimson"; 26° 14' N.: 98° 46' E., on trees in forests on the lower ridges of the divide. 2530-2900 m., fls. July, *Forrest* 27080, "Epiphytic plant of 1-4 ft. Flowers deep crimson."

Besides the colouring of the flowers I can see no differences between the three collections except that in the last cited the leaves are more coriaceous and some of them (the lower ones) smaller and more elliptic. In all three in the dry state the bracteoles and the sepals appear to be concolorous with the corolla.

In Not. R. Bot. Gard. Edinb. 18, 190, Anthony has published the combination *Aeschynanthus Peelii* Hook. f. et T. var. *oblanceolata* Anth. citing *Forrest* 24933 & 27080. I consider that the differences between these and the type of the species, as also of *A. bracteata* Wall. are sufficiently pronounced to merit elevation to specific rank; indeed they are greater than those Anthony (l.c.) indicates between the two older species, which, he thinks, were wrongly merged by C. B. Clarke in Fl. Brit. Ind. 4, 342. I am not prepared to express an opinion on this point as the type of *A. bracteata* (Wall. Cat. 794) is not available at the moment. A rather poor duplicate of it, however, shows that one of Anthony's points of difference—the relative length of the peduncles and petioles—is not valid. *A. oblanceolata* (Anth.) Fisch. diverges more from either of the two older species than they do from each other. One character showing a marked difference is not mentioned by Anthony. In both the older species the stamens are well-exserted from the corolla, in the new one the anthers are in the corolla-mouth. (I have not seen the Edinburgh sheets, but duplicates of the 2 cited are in the Kew Herbarium.)

***Lysionotus gracilipes*** C. E. C. Fischer, sp. nov. [Gesneriaceae]; *L. pubescenti* C. B. Clarke peraffinis, caulibus anisophyllis, foliis ellipticis minoribus subtus pubescentibus, capsula graciliore differt.

Epiphytic *undershrub*; branchlets more or less compressed, brown, glabrous below, brown-tomentose upwards. *Leaves* thinly coriaceous, opposite or ternate, rarely alternate, narrowly elliptic or elliptic-lanceolate, acute at both ends, 2.5-6.5 cm. long, 0.5-1.7 cm.



wide, those at the same node unequal, primary nerves 4-6 pairs, glabrous above, thinly clothed with multicellular hairs below, margins sinuate; petioles terete, 1-4 mm. long, tomentose. *Inflorescence* axillary, of 3-6-flowered umbels, one or two branches of the umbels often 2-flowered; peduncles filiform, up to 11 cm. long; bracts at the base of the umbel 2, ovate, obtuse, 3 mm. long, glabrous; bracteoles similar, smaller. *Sepals* 5, oblong-lanceolate, subacute, bluntly apiculate, 5 mm. long, 1.5 mm. wide, 3-nerved. *Corolla* tubular-ventricose, white, thinly pubescent outside; tube 3.2 cm. long; limb 2-lipped; anterior lip of 2 oblate, rounded lobes 2.5 mm. long, 5 mm. wide, with 2 folds in the throat 6 mm. long, 2 mm. wide, tapering in front, semi-cordate at the base; posterior lip 3-lobed, 1.3-1.5 cm. long, terminal lobe oblong, 6 mm. long, lateral broadly ovate, 5 mm. long. *Stamens* 2, included; filaments inserted just above the middle of the corolla-tube, flat, curved towards the apex, 1.2 cm. long; anthers sub-circular, 1.6 mm. diam., confluent. *Disk* annular, lobiculate, 1.3 mm. long. *Ovary* shortly stipitate, linear, 1.5 cm. long; style compressed, 8.5 mm. long; stigma hardly wider. *Capsules* slender, acuminate, 5-6 cm. long. *Seeds* not seen.

NAGA HILLS: Kohima, 2350 m., fls. & frt. Aug. *N. L. Bor* 6232 (type in Kew Herb.).

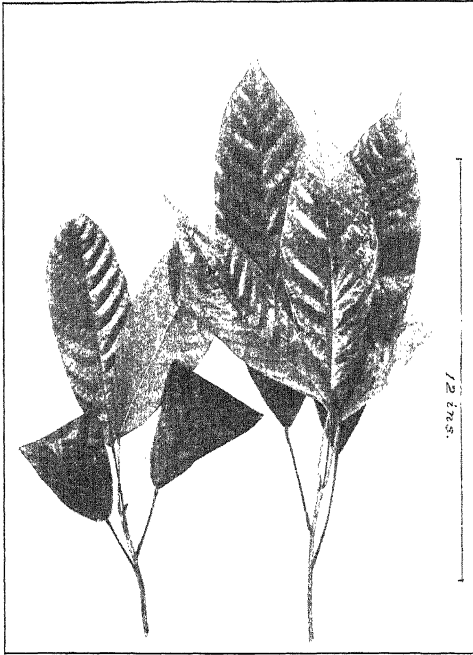
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#### IV—NOTE ON THE VEGETATIVE PROPAGATION OF CACAO AT KEW. G. EVANS.

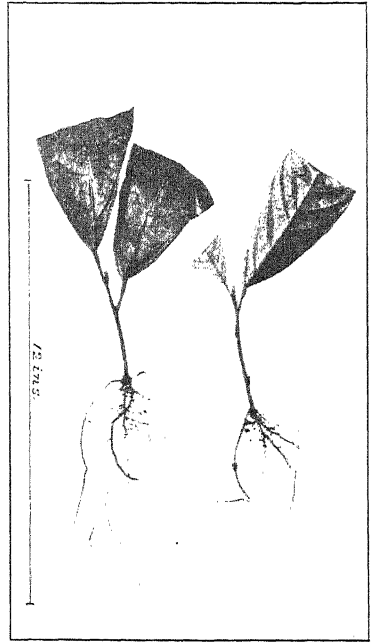
For some years past the Royal Botanic Gardens have been actively concerned in the transfer of cacao plant material from one part of the British Empire to another.

The West African cacao growing colonies, Nigeria and the Gold Coast, have for some time been interested in the results obtained by the cacao research workers at the Imperial College of Tropical Agriculture in Trinidad and have been desirous of obtaining plant material from the selected clones of high grade "Forestero" cacao that have been one of the results of this research. West Coast cacao is of lower quality than the West Indian types which usually contain a proportion of "Criollo" or "*pentagona*" blood and command higher prices in the world's market.

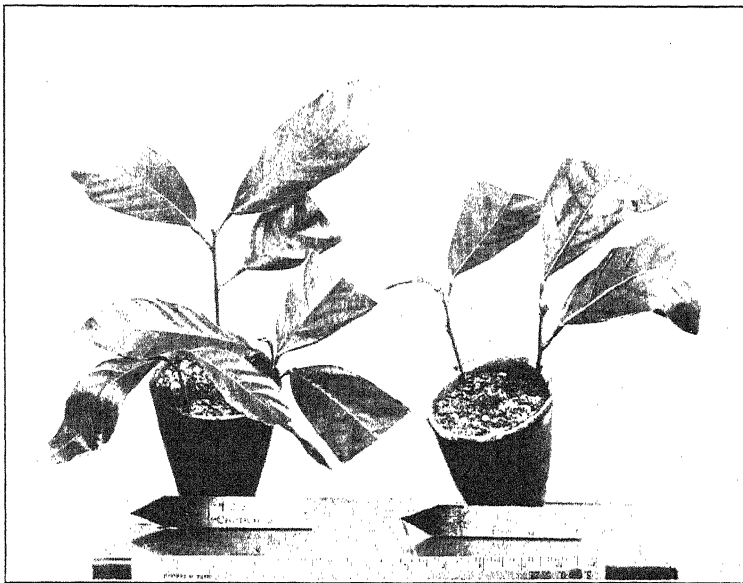
There are, however, certain serious diseases in the West Indies, such as the "witches broom" caused by *Marasmius perniciosus*, which do not occur in West Africa, and in order to avoid the risk of their introduction the West African colonies are naturally taking all precautions, and consequently the Governments have prohibited the direct importation of all living cacao material. It is for this reason that the good offices of Kew have been sought and any material from the West Indies has now to come to the Royal Botanic Gardens in the first place, where it is grown in quarantine under supervision and is not released until it has been inspected by the officers of the Imperial Mycological Institute.



1.



2.



3.

Fig. 1. Soft-wood cuttings of cacao: cutting on left trimmed ready for potting



Different kinds of material have been handled by Kew in the last two or three years. Seedlings have been raised from pods sent from Trinidad and from Nigeria, and the technique for the transportation of pods, to ensure that the seed is viable on arrival, has been developed.

Experiments in budding have also been made and a number of seedling plants raised from Nigerian seed have been used as root stocks and have been successfully budded.

It must be remembered, however, that Kew is working under some difficulty, since the cacao plants have to be raised in tropical houses where accommodation is strictly limited. In addition, because of weather conditions, the opportunity for exporting plants is restricted to the four summer months, and available space may, therefore, be severely taxed at certain times of the year. As several hundred plants are wanted by the West African colonies, it is important to devise a method whereby the required material can be raised and exported as rapidly as possible, and to send off the plants as soon as they are strong enough to travel. The smaller the plants, the less space will they occupy and the larger will be the number that can be packed into a Wardian case. This would result not only in a speeding up of operations, but also in a saving in the cost of packing and shipping. For these reasons, it was decided, in the autumn of 1939, to carry out experiments to test the possibility of rooting cuttings. As these have given better results than were anticipated, it should be of value to place on record the results of the first preliminary trials.

In Trinidad, cacao has been successfully rooted for some years past and cuttings of semi-hard wood, 7 or 8 inches in length, and about as thick as a lead pencil, are used. This system could possibly be adopted in Kew, but it has certain disadvantages. In the first place a good deal of material is required, and space at Kew is naturally limited, and secondly, the rooted plants are somewhat large and so occupy too much space in a Wardian case.

It was, therefore, determined to try and root young slips. The material used in the experiment (see Plate III) consisted of young soft-wood cuttings or slips, not thicker than a programme pencil, bearing only three or four fully developed leaves. These were taken from side shoots of clonal plants on their own roots received from Trinidad about a year ago, which are now growing in pots in the tropical houses at Kew. The cuttings taken are only about four inches in length, and about half the length is buried in the soil. It seems to be immaterial whether the cutting is made at the node or not, or whether a small heel of maturer wood from the main branch is attached.

The cuttings were planted in the regular compost used at Kew which consists of about two parts loam to one of sand and one of black peat. So far no plant growth substances have been used, but it is possible that these may be tried in future experiments.

Twenty cuttings were taken and after the leaf surface had been reduced, they were potted into 2 inch pots on 9th October, 1939. The pots were placed in a small case or wooden frame with a glass top about 4 ft. by 4 ft. in size, and this contained a 5 inch layer of coconut fibre, overlying a hot water tank at a temperature of about 115° to supply bottom heat. This case is one of several in the tropical pits in which the temperature varies between 75° and 85° and where the humidity is kept as high as possible, being usually between 70 and 80.

Callus rapidly formed and the first signs of rooting appeared early in November. On 11th January, 1940 (when the accompanying photographs were taken), the majority of the cuttings had rooted most satisfactorily, some of the roots being 5 inches long. At the same time growth above ground had commenced and the leading shoot was often over an inch in length with new leaves unfolding.

Of the twenty cuttings potted in October fifteen were well rooted and had begun to put on growth by the beginning of January. Ten of these were of I.C.S.1 and five of I.C.S.7, which are the two Trinidad clones at present available in Kew. There seems to be little difference between "fan" or "chupon" cuttings in the matter of striking, as nine of the rooted plants are from "chupons" and six are from "fan" shoots.

The experiments, so far as they go, are distinctly promising because it must be remembered that the period covered by them is probably the worst of the whole year for the purpose, owing to the prevalence of fog and the scarcity of sunlight. It seems likely that even better results may be obtained in the spring as the daylight improves, and it is also hoped that the time required to raise a stock of rooted plants fit to travel will be shortened.

There seems a possibility that by using the method described above, smaller, sturdier plants, occupying less space in a Wardian case, and less liable to damage in transit than budded plants, may be produced. The process is also far simpler and involves much less labour and greenhouse space than does the budding method.

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## V—NEW OR LITTLE-KNOWN PLANTS FROM SOUTHERN INDIA: XII.\* C. E. C. FISCHER.

***Centratherum indicum*** (Less.) C. E. C. Fischer, comb. nov. [Compositae].

The combination *Centratherum reticulatum* (DC.) Benth. has been generally adopted for this plant, this epithet having been transferred from *Decaneurum reticulatum* DC. in Wight Contrib. Bot. Ind. 7, 1834. But as this publication was antedated by *Amphirephes indica* Lessing in Linnaea, 6, 687, 1831, the epithet *indica* must be retained.

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\* Continued from K.B. 1939, 662.

**Centratherrum Mayurii** C. E. C. Fischer, sp. nov. [Compositae] ; *C. indico* (Less.) C. E. C. Fisch. affine, foliis ellipticis vel elliptico-oblongatis haud rugulosis haud reticulatis, involucri bracteis lineari-lanceolatis distinctum.

A robust *herb* ; stem terete, branched above, brown, striate, more or less densely furnished with multicellular black-banded (when dry) hairs from small, black tubercles. *Leaves* alternate, cauline (lower parts not seen) elliptic-oblongate, acute, base decurrent, 4-6.5 cm. long, 1-2.5 cm. wide, dark brown (when dry) above and abundantly furnished with crisped, pale-brown, multicellular hairs, below white-tomentose except the glabrous, brownish midrib and 9-10 pairs of parallel primary nerves, secondary nerves scalariform, obscure, margins sharply serrate ; petioles up to 5 mm. long ; uppermost leaves sessile, narrowly elliptic-lanceolate, margins nearly entire, otherwise like the lower. *Capitula* solitary, axillary on short peduncles or terminating leafless twigs, campanulate, 1 cm. diam., subtended by 2-3 leafy, apiculate, setose-ciliate bracts resembling the upper leaves, up to 2.5 cm. long. *Involucral bracts* 5-seriate, linear-lanceolate, pungently acuminate, 7.5-10.5 mm. long, innermost longest, the outermost with similar indumentum to that of the leafy bracts, the next 2 rows with the indumentum only in the apical half, the rest of the rows glabrous. *Receptacle* flat, naked. *Ovary* oblong, slightly obovate, 1.4 mm. long, 10-ribbed, glabrous. *Pappus* copious, white, 4.3-5 mm. long, of ascendingly long-barbellate setae. *Corolla* purple ; tube filiform, very slightly expanded at the mouth 5.5 mm. long ; lobes 5, linear, 1.5 mm. long. *Anthers* linear, base minutely 2-apiculate, 1.3 mm. long. *Style-arms* 2, linear, subacute, puberulous. *Achenes* like the ovary, pale-brown, 1.5-1.7 mm. long.

MYSORE STATE : Kemmangundi Hills, fls. and frt. Nov., *P. V. Mayuranathan* without number (type in Kew Herb.).

The species is named in honour of the collector.

**Senecio kundaicus** C. E. C. Fischer, sp. nov. [Compositae] ; *S. Wightii* (DC.) C. B. Clarke peraffinis, caulibus sparse puberulis, foliis lineari-oblongis obtusis minute dentatis, involucri bracteis numerosioribus apice penicillatis, ligula 4-nervata pappo instructa differt.

A nearly glabrous *herb* ; stem sulcate, sparsely puberulous. *Leaves* alternate, upper cauline (lower parts not seen) sessile, linear-oblong, apex rounded, base amplexicaul, auricles rounded, 6-12 cm. long, 1-2.1 cm. wide, primary nerves about 10 pairs, obscure, margins minutely, rather distantly toothed ; the terminal leaf smaller and subacute, forming a bract to the corymb. *Corymbs* terminal, few-capitulate ; bracts at the divisions similar to the terminal leaf but much smaller. *Capitula* turbinate, 5-6 mm. diam. *Involucral bracts* about 30 in 1 series with 1-2 shorter at the base, linear, obtuse or subacute, 7-7.5 mm. long, glabrous except the penicillate tips. *Receptacle* flat, naked, smooth. *Ray florets* few

in 1 row; ovary linear-oblong, truncate, shallowly ribbed, 1.5 mm. long, glabrous, apparently fertile; *pappus* ample, white, 5 mm. long; *ligule* yellow, tubular portion very slender, 4 mm. long, limb elliptic-oblong, shortly 3-toothed and 4-nerved with the 2 central nerves forking near the apex and joining each other and the lateral in the teeth or 2-toothed with one lateral nerve evanescent near the apex and only one of the remaining central ones forking, 6.5 mm. long, 3 mm. wide; *style-arms* 2, slender. *Disk florets* numerous, yellow; *ovary* and *pappus* as in the ray florets; *corolla* 5 mm. long, tube slender below, narrowly funnel-shaped in the upper third, lobes 5, triangular, acute, short, *anthers linear*, 1.5 mm. long, acute, base minutely 2-apiculate; *style* shortly exserted, arms 2, short, truncate. *Achenes* not seen.

NILGIRI HILLS, on the Kundahs, fls. Sept., *P. V. Mayuranathan* without number (type in Kew Herb.).

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## VI—MISCELLANEOUS NOTES.

**The Professorship of Forestry at Oxford.**—MR. H. G. CHAMPION, M.A., I.F.S. has been elected to the Chair of Forestry at the University of Oxford in succession to the late Professor R. S. Troup, C.I.E., D.Sc., F.R.S. Mr. Champion has served with distinction for over 25 years in the Indian Forest Service. He was at one time Silviculturist at the Forest Research Institute at Dehra Dun and lately acted as Conservator of Forests in the United Provinces.

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**Mr. J. R. Sealy.**—MR. J. R. SEALY, B.Sc., has been appointed by the Minister of Agriculture and Fisheries to the post of Assistant Botanist (Temporary) as from January 1st, 1940. Mr. Sealy has been assistant to the Editor of the Botanical Magazine since 1927.

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**SIDNEY ALFRED SKAN.**—We record with deep regret the death on December 19th, 1939, at the age of 69, of Mr. S. A. Skan, who retired from the post of Botanist at the Herbarium in 1933 (K.B. 1933, 462).

Skan was born on August 30th, 1870, and received his early horticultural training at the Edgbaston Botanic Garden, under Mr. W. B. Latham. Mr. Latham, who had been trained at Kew, was an extremely successful horticultural instructor, and Skan was one of five young gardeners who came to Kew from Edgbaston during the nineties of last century.

Skan entered Kew as a Student Gardener on September 19th, 1892, and after working in the Arboretum and Temperate House pits, he sat for a competitive examination in 1894 for a post as Assistant in the Herbarium. He had always shown an interest in the botanical side of his work and he was very anxious to seize this chance of a botanical career. He worked every spare minute for six weeks before the examination and came out head of the list.

He was appointed Assistant on July 16th, 1894, and relieved Hemsley (then Principal Assistant) of the routine work of the Library; this absorbed the major part of his time and energies to the end of his career. After 1899 he was, in fact, Librarian, though he was not actually given this title. He was responsible for the annual lists of additions to the Library from 1899 to 1916, and for the Supplement to the Library Catalogue published in 1919.

Among the reforms effected by Skan was the rearrangement of the main body of the tracts in a single alphabetical series, thus greatly facilitating consultation. The maintenance of the Library in a satisfactory condition and its judicious expansion were due largely to his unceasing care and skill. His devotion to the interests of the Library naturally left him but little time for scientific work. Nevertheless, he elaborated the *Juglandaceae*, *Cupuliferae-Quercineae*, *Ceratophyllaceae* and *Gnetaceae* for the "Index Florae Sinensis" (1899), and (with Hemsley) prepared the account of the *Scrophulariaceae* for the "Flora of Tropical Africa" (1906), describing 54 of the 59 new species. He retained his interest in horticulture, and contributed a series of annual lists of plants introduced into cultivation during the period 1897-1915. Their discontinuance removed a valuable source of information on the history of garden plants. A list of his publications up to the year 1906 is given in Kew Bull. 1907, App. 5, p. 136.

Skan's exceptionally good memory and very wide knowledge of botanical literature were always placed freely at the disposal of his colleagues and of visitors to Kew, and he often went to great trouble to help junior members of the staff in their difficulties, whether these were concerned with identifying some garden plant or in tracing an obscure reference. He will be remembered as an example of devotion to duty, and for consistently placing the interests of Kew before his own.

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#### **Scientific Collaboration between Britain and France.—**

Two members of the Delegation from the Centre National de la Recherche Scientifique, Professor L. Blaringhem, Professor of Botany at the Sorbonne, and Professor P. Chouard, Professor of Agriculture at the Conservatoire National des Arts et Métiers, visited Kew on Tuesday, January 30th, after an earlier visit to the John Innes Horticultural Institution at Merton. They were met by the Director and discussed co-operation in various fields with Dr. Metcalfe, and with Dr. Tincker, who came from Wisley to meet them. They also visited the Herbarium after a general tour of the Gardens.

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**Botanical Magazine.**—Part 3 of vol. 162, which was published on December 30th, 1939, contains the following plant portraits: *Astragalus Durhamii* Turrill (t. 9579), a fine yellow-flowered species found by Lt.-Col. F. R. Durham on the Gallipoli Peninsula;



*Calorhabdos Brunoniana* Benth. (t. 9580), a native of the East Central Himalaya and South-West China; *Codonopsis convolvulacea* Kurz var. *Forrestii* (Diels) Ballard (t. 9581), a new variety from Yunnan and Szechwan; *Leptospermum scoparium* J. R. et G. Forster var. *eximium* B. L. Burtt (t. 9582), a striking large-flowered new variety from Tasmania introduced by Mr. H. F. Comber; *Crocus Sieheanus* Hort. Barr. ex B. L. Burtt (t. 9583), a new species or hybrid from the Taurus Mountains; *Primula laciniata* Pax & K. Hoffm. (t. 9584), a native of West Szechwan; *Leucojum trichophyllum* Schousboe (t. 9585), a dainty species found in Southern Portugal, Spain and the littoral regions of Morocco and Algeria; *Nymphaea polychroma* A. Peter (t. 9586) a fine blue-flowered water-lily from Tanganyika Territory; *Rhododendron fulvum* Balf. f. & W. W. Sm. (t. 9587), distributed from W. Yunnan to Upper Burma; *Osbeckia yunnanensis* Franchet ex Craib (t. 9588), discovered by Delavay and found in Yunnan, Hupeh and Kweichow; and *Arisaema sikokianum* Franchet & Savatier (t. 9589), a native of the island of Shikoku, Japan.

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27. MAY 1940

# BULLETIN OF MISCELLANEOUS INFORMATION No. 2 1940 ROYAL BOTANIC GARDENS, KEW

## VII—TROPICAL AFRICAN PLANTS: XVIII.\*

### SAXIFRAGACEAE.

**Vahlia Goddingii** E. A. Bruce, sp. nov. [Saxifragaceae]; affinis *V. somalensis* Chiov., sed caulibus et ramis glabris, receptaculo glabro vel nonnunquam basi pilis longis paucissimis instructo differt.

*Herba* erecta vel suberecta, 30–40 cm. alta, ramosa, caulibus erectis vel adscendentibus glabris, senioribus teretibus basi induratis 3–4 mm. diametro, junioribus subgracilibus circiter 1.5 mm. diametro, internodiis 1–3 cm. longis. *Folia* sessilia, chartacea, lanceolata vel ovato-lanceolata, apice acuta vel leviter acuminata, basi rotundata vel late cuneata, 1.3–3 cm. longa, 0.5–1.2 cm. lata, utrinque glabra, margine integra, nervis inconspicuis. *Flores* ex axillis foliorum superiorum 1–2 fasciculati vel brevissime pedunculati; pedicelli 1–2 mm. longi; bracteolae lineari-subulatae, circiter 2 mm. longae, parce pilosae. *Calyx* 5-partitus, lobis ovatis vel ovato-lanceolatis acute acuminatis circiter 5 mm. longis 2.5 mm. latis glabris, receptaculo subturbinato 2.5 mm. longo 3 mm. diametro valde 5-costato glabro vel basi pilis longis paucissimis instructo. *Petala* 5, flava, obovata, calycis lobis longiora, 5–6 mm. longa, 3–4 mm. lata, apice subrotundata. *Filamenta* circiter 5 mm. longa, parce pubescentia, basi squamula hyalina  $\pm$  transverse elliptica 1 mm. lata parce lanato-pubescente; antherae oblongae, 2 mm. longae. *Styli* 2, 6–7 mm. longi, parce et breviter pubescentes; stigmata discoidea.

BRITISH SOMALILAND. Harradigit, 44° 31' E., 7° 40' N., 981 m., Nov. 1934, *Godding* 237 (type):—a small plant with yellow flowers; native name "Wandeck."

### BALSAMINACEAE.

**Impatiens** (Salpingochilon) **Tweediaeae** E. A. Bruce, sp. nov. [Balsaminaceae]; affinis *I. kilimanjari* Oliv. sed foliis acute serratis haud crenatis, alis corollae majoribus et valde inaequaliter bilobis differt.

*Herba* 30–45 cm. alta, erecta; caules glabri vel apicem versus lepidoti, internodiis 2–4 cm. longis inferioribus longioribus. *Folia* opposita, petiolata; petiolus 0.5–2.5 cm. longus, basi leviter ampliatus, glaber vel pilis paucis brevibus in sulco vestitus; lamina elliptica vel ovato-elliptica, apice acute acuminata, basi cuneata, supra pilis paucis brevibus ornatis demum glabra, infra glabra,

\* Continued from K.B. 1939, 247.

2.5–9 cm. longa, 1.5–3.5 cm. lata, margine acute glanduloso-serrato, nervis lateralibus utrinsecus circiter 8 arcuato-ascendentibus. *Flores* subglabri, in axillis foliorum superiorum 1 vel 2 dispositi, rosei et albi vel scarlatini, longe pedicellati, pedicellis 2–5 cm. longis glabris basi bracteatis; bractee lineari-lanceolatae, acutae, circiter 2 mm. longae. *Sepala* 2, oblongo-lanceolata, 5 mm. longa, apice acuta, glabra. *Labelium* infundibuliforme, fauce obliquo, infra apiculatum, circiter 1 cm. diametro; calcar latum, basin versus angustatum, incurvatum, circiter 1.5 cm. longum, parte inferiore 0.5 cm. incurvato; alae ovatae, apice rotundatae, 1.2 cm. longae, profunde et inaequaliter bilobae, lobo inferiore majore late ovato 7 mm. longo 5 mm. lato, lobo superiore ovato-lanceolato 4 mm. longo 2 mm. lato; vexillum late ovatum, cucullatum, dorso carinatum, apice acutum, 7 mm. longum et latum. *Fructus* subcylindricus, basi et apice leviter angustatus, 1.4 cm. longus, 0.4 cm. diametro, glaber.

KENYA COLONY. Mt. Elgon, 3750 m. and higher, Nov. 1932 fl. & fr., *Mrs. Tweedie* A.2. East Elgon, 2850 m., by stream in forest, Jan. 1937 fl., *Mrs. Tweedie* 366:—flowers a brilliant scarlet, plant up to 30 or 45 cm. high. East Elgon, 3240 m., on river bank in the tree-heath belt, grass and woodland, Jan. 1937 fl., *Mrs. Tweedie* 637 (type):—lovely pink and white flowers. Mt. Elgon, about 3240 m., Feb. 1937 fl., *Mrs. Tweedie* 367A. (in spirit).

#### THYMELAEACEAE.

***Lasiosiphon mollissimus*** E. A. Bruce, sp. nov. [Thymelaeaceae]; affinis *L. Hoepfneriano* Vatke, sed capitulis majoribus sessilibus vel subsessilibus, involucri bracteis oblongis vel ellipticis apice rotundatis vel subacutis nonnunquam apiculatis haud acuminatis differt; a *L. polyantho* Gilg involucri bracteis latioribus, calycis tubo breviori distinguendus.

*Suffrutex*. *Caules* multi, erecti, lignosi, brunnei, simplices vel parce ramosi, basi 3–5 mm. diametro, parce et molliter albido-pilosi. *Folia* spiraliter orta, sessilia vel subsessilia, congesta, oblonga vel oblanceolata, 2.5–3.5 cm. longa, 0.8–1 cm. lata, basin versus sensim angustata, apice subacuta interdum apiculata, utrinque et margine adpresse albido-sericeo-pilosa, supra nervis plus minusve inconspicuis, subtus costa media inferne prominula. *Capitula* terminalia, circiter 50-flora, sessilia vel subsessilia, 3.5–4.5 cm. diametro. *Involucri bractee* circiter 10, imbricatae, oblongae vel ellipticae, foliis breviores, 1.3–1.7 cm. longae, 0.7–1.1 cm. latae, extra dense adpresse sericeo-pilosae, intus inferne brunneae glabraeque, superne breviter albido-tomentosae. *Flores* 5-meri, sessiles. *Calycis tubus* angustato-cylindricus, 1.4–1.7 cm. longus, vix 1.5 mm. diametro sed infra faucem (ubi stamina inserta) 2 mm. et basin versus (circa ovarium) 2.5 mm. amplius, 7 mm. supra basin articulatus, supra articulum dense adscendente albido-sericeo-pilosus, infra densissime adscendente penicillatus; calycis lobi flavidi, patentes, oblongi vel oblongo-elliptici, circiter 3 mm. longi, 2.5 mm. lati, apice late

rotundati vel emarginati, extra secus medium parce sericeo-pilosi, ceterum glabrescentes, intus glabri. *Petala* membranacea, ovata vel ovato-orbiculata, circiter 1.5 mm. longa, basi rotundata, apice rotundata plerumque abrupte breviterque acuminata. *Stamina* 10, biseriata, seriei superioris breviter exserta, inferioris in tubo faucem versus inserta; antherae sessiles vel subsessiles, circiter 1 mm. longae. *Ovarium* angustato-ellipsoideum, 3-4 mm. longum, circiter 1 mm. diametro, superne parce adscendente pilosum, inferne glabrum, in stylum sensim angustatum; stylus circiter 1 cm. longus, 3 mm. supra basin articulatus, stigmatibus, globoso 0.5 mm. diametro.

NORTHERN RHODESIA. Abercorn District. Near Malombe, on the road to Kambole, in short grass and "dambo" on plateau in *Brachystegia* forest, 1650-1800 m., 2 June 1936, *Burtt* 6115 (type):—clumps of yellow flowers. In small seasonal swamps or "dambo" in high plateau country, *Burtt* 6111:—clumps of honey-scented, orange flowers. On road to Issanga Estate, in stunted *Brachystegia* woodland on hill-tops, 1500 m., 21 April 1936, *Burtt* 6108:—clumps of ochre-yellow flowers.

#### EUPHORBIACEAE.\*

**Euphorbia Daviesii** E. A. Bruce, nom. nov.—*Euphorbia imbricata* E. A. Bruce in Kew Bull. 1933, 468, non *E. imbricata* Vahl Symb. Bot. 2, 54 (1791).

**Monadenium magnificum** E. A. Bruce, sp. nov. [Euphorbiaceae]; affinis *M. asperrimo* Pax sed foliis majoribus caulis apicem versus aggregatis, pedunculis longioribus differt.

*Planta* 0.6-1.5 m. alta. *Radix* verosimiliter tuberosa. *Caules* 1-4 e radice orti, erecti, succulenti, 4 vel 5-angulati, apice circiter 2 cm. basin versus angustati 1-1.5 cm. diametro, cicatricibus foliorum paucis semi-orbicularibus 6 mm. diametro ornati; anguli caulis aculeati, aculeis rubris basi plerumque contiguis angustato-conicis 1-3 mm. longis induratis interdum furcatis. *Folia* viridia demum rubescentia 5 vel 6 apice caulis aggregata, sessilia, late elliptica vel obovata, 10-15 cm. longa, 6-10 cm. lata, glabra, apice rotundata, basi angustata, margine minutissime aculeato-denticulata, costa media infra aculeato-alata, nervis lateralibus inconspicuis. *Dichasia* pluria, apice caulis aggregata; pedunculi primarii 9-14 cm., secundarii 3-5 cm., tertiarii 1-3 cm., ultimi 0.5-1 cm. longi, omnes glabri, tetragoni, 3-5 mm. diametro, angulis aculeatis; bracteae late oblongae, vix 1 cm. longae, 4 mm. latae, dorso angustato-undulato-alatae; prophyllum cyathii speciosum, coccineum, oblongo-lanceolatum, 8 mm. longum, 4 mm. latum, glabrum, apice rotundatum vel subtruncatum, dorso aculeato-alatum. *Cyathium* prophylo brevius, circiter 6 mm. longum, cupuliforme, glabrum, latere anteriore vix usque medium aperto, lobos interiores subquadratos fimbriatos superans, margine paullo incrassato. *Ovarium*

\* For *Macaranga Dawei* see *Myricaceae* p. 53.

exsertum, reflexum, glabrum, 4 mm. longum et latum, 3-angulatum. *Styli* 1 mm. longi, triente inferiore connati, apice bilobati. *Capsula* 3-angulata, circiter 5 mm. longa, 4 mm. lata, angulis angustissimis alatis. *Semina* oblonga, tetragona, basi et apice truncata, albescentia, tuberculata.

TANGANYIKA TERRITORY. Gulwe Valley, near Mpwapa, 11 July 1937, fl. and fr., *Burt* 6597 (type):—a succulent 0.6–0.9 m. high, stem 4- to 5-angled with double spiny processes along the angles; leaves green, turning red with age; flowers scarlet and remarkably spectacular, borne at the apex of the stem; 990 m., in *Commiphora-Acacia* bush in open seasonally flooded glades, 26 April 1932, fl., *Burt* 3914:—stem spiny, 4-angular, 0.6–0.9 m. high, with a crown of 5 or 6 green, lanceolate leaves; flower-spike crimson lake. Dodoma Province: Gulwe, 840 m., common but scattered in *Commiphora-Bush-Formation*, 19 Aug., fl. and fr., *Greenway* 2408:—Slender stemmed succulent plant up to 1.2 or 1.5 m. high, with red flowers; stems not much branched, angular with numerous small red branched spines. Iringa Province: Pawaga District, 780–900 m., May–June 1936, fl. and fr., *Ward* P. 16.

Mr. Greenway notes that under cultivation 3 or 4 stems are produced and the plant has a somewhat bushy head 0.6–0.9 m. high.

#### PAPILIONACEAE.

***Crotalaria diloloënsis* Bak. f.** in Rev. Zool. Bot. Afr. **21**, 297 (1932).  
*C. praecox* Milne-Redhead in Hook. Ic. Pl. **33**, t. 3244 (1934).

BELGIAN CONGO. Dilolo, *de Witte* 626 (type in Brussels Herb.).

NORTHERN RHODESIA. Mwinilunga District. In open space in *Brachystegia* woodland, after grass fire, near Matonchi Farm, 1 Sept. 1930, *Milne-Redhead* 1010 (type of *C. praecox*):—perennial herb with running habit and thick rhizome; flowers yellow with purple veinings; old unburnt shoots much longer than young flowering shoots. Slope above Kalenda dambo west of Matonchi Farm, in open ground after burning, 8 Oct. 1937, *Milne-Redhead* 2639:—perennial with running rootstock; leaves rather glaucous; flowers yellow marked with reddish-brown; fruits unripe. Slope above Kalenda dambo west of Matonchi Farm, among *Lannea humilis*, *Sphenostylis erecta*, grasses, etc., 14 Febr. 1938, *Milne-Redhead* 2639A:—plants hidden by grass, not in flower; leafy shoots 12–14 inches long. Near Kalene Hill, in scrub near edge of plain, Nov., *Miss Marks* 12:—plant 6–8 inches high, grows in clumps; flowers yellow.

E. M-R.

***Crotalaria Elisabethae* Bak. f.** in Journ. Linn. Soc. Bot. **42**, 301 (1914). *C. mumbwae* Bak. f. in Journ. Linn. Soc. Bot. **42**, 300 (1914), *synon. nov.*

BELGIAN CONGO. Elisabethville, in bush savannah, 17 May 1912, *Bequaert* 46 (type in Brussels Herb.). Elisabethville, 1927, *Quarré* 261.

NORTHERN RHODESIA. Solwezi District. In *Brachystegia* woodland near Mutanda Bridge, 20 June 1930, *Milne-Redhead* 542 :—erect annual 6–9 dm. high. On stony waste ground at quarry near Mutanda Bridge, 21 June 1930, *Milne-Redhead* 567 :—erect branched annual, 3 dm. high ; flowers yellow and purple-brown. Mumbwa District. Near Mumbwa, *Mrs. Macaulay* 399 (type of *C. mumbwae* Bak. f.), 736, 801 :—flowers yellow.

The additional gatherings now available show these species to be conspecific, though considerable variation is noticeable in the size and habit of the plants. The degree of indumentum on the calyx and petals is also rather variable. The type specimen of *C. mumbwae* is in fruit : the only keel petals remaining appear withered, which would account for the difference in sizes given in the descriptions, and used as a distinguishing character in the key.

E. M-R.

#### MYRICACEAE.

The type specimen of *Macaranga Dawei* Prain, *Dawe* 595, has been dissected and proves to be synonymous with *Myrica salicifolia* Hochst. ex A. Rich. Prain in his diagnosis of *M. Dawei* in Kew Bull. 1911, 232 states :—"species nulli africanæ arcte affinis"—so he evidently thought his new species was very distinct from the other species of *Macaranga*. Unfortunately neither female flowers nor fruits were present on the specimen, for if these had been available there would have been no doubt that the plant was not a member of the *Euphorbiaceae*. In reviewing the species of *Myrica* in connexion with the above problem, it is considered that *M. kilimandscharica* Engl. and *M. salicifolia* Hochst. ex A. Rich. are synonymous. Engler in describing the former species separated it from *M. salicifolia* on the character of the male flowers being *single* in the axils of the bracts. This character, however, is not constant. In the Flora of Tropical Africa the species are separated on leaf characters and on the density of lenticellation of the branches, neither of which characters seems to be very satisfactory. The shape, size and dentation of the leaf is very variable, as was mentioned by A. Richard in a note following his description of *M. salicifolia*, so that this cannot be taken as a character of specific importance. The synonymy is therefore as follows :—*Myrica salicifolia* Hochst. ex A. Rich., Tent. Fl. Abyss. 2, 277 (1851). *M. kilimandscharica* Engl., Hochgebirgsfl. Trop. Afr. 188 (1892). *M. kilimandscharica* Engl. var. *macrophylla* Engl. Jahrb. 28, 375 (1900). *Macaranga Dawei* Prain in Kew Bull. 1911, 232. It is most probable that *Myrica salicifolia* Hochst. ex A. Rich. var. *subalpina* Engl. should be included under the above synonymy. Specimens from the type locality have been examined, but not the type numbers of the variety.

E. A. B.

#### RUTACEAE.

*Aeglopsis Eggelingii* M. R. F. Taylor, sp. nov. [Rutaceae] ; ab *A. Chevalieri* Swingle habitu fruticoso, spinis axillaribus

nonnunquam binatis, pedicellis bracteatis, alabastris globosis, petalis 3 vel 4 ovatis nunquam lanceolatis, stamina petalis triplo numerosiora, ovario 7- vel 8-loculari differt.

*Frutex* ramosus, 4 m. altus, armatus, glaber. *Rami* teretes, juniores compressi, brunnei, internodiis 2-4 cm. longis, spinis axillaribus solitariis vel binatis 2-3 cm. longis rigidis rectis patentibus. *Folia* simplicia, alterna, subcoriacea; petiolus 5-8 mm. longus, canaliculatus, pulvinatus; lamina ovata vel ovato-lanceolata, 7-14 cm. longa, 3-5.5 cm. lata, apice obtusa vel acuta vel saepe acuminata, basi sensim cuneata, margine leviter et irregulariter crenata, supra fusco-viridis, subtus pallido-viridis, utrinque dense pellucido-punctata, costa prominente, nervis lateralibus utrinsecus 7-10 patentibus arcuatis. *Inflorescentiae* axillares, pauciflorae (circiter 5); pedunculi irregulariter ramosi, ramis brevissimis (usque 3 mm. longis); pedicelli 3 mm. longi, ampliati, bibracteati, glanduloso-punctati; bracteae ovato-lanceolatae, 1 mm. longae, obtusae. *Flores* 1.5-2.5 cm. diametro, viridi-albi; alabastra globosa vel leviter 3-4-lobata, circiter 4 mm. diametro. *Petala* 3-4, ovata, 1 cm. longa, 7-8 mm. lata, apice obtusa, basi truncata, crassa, glanduloso-punctata, supra longitudinaliter striata, margine apicem versus saepe leviter incurva. *Stamina* 9-12 (petalis triplo numerosiora); filamenta liguliformia, apicem versus attenuata, circiter 5 mm. longa, 1 mm. lata, compressa, crassa, incurva, connectivo apice glanduloso; antherae oblongae, 2 mm. longae, circiter 1 mm. latae. *Discus* annularis, 5-6 mm. diametro, 1.5-2 mm. altus, lobatus, sulcatus. *Ovarium* ovoideum, 3-4 mm. longum, 2-3 mm. diametro, basi in disco immersum, loculis 7-8, ovulis numerosis. *Stylus* 2 mm. longus, 1 mm. diametro, teres; stigma cylindricum, circiter 1.5 mm. diametro. *Fructus* subpyriformis, 9-11 cm. longus, 7-8 cm. diametro, odoratus, cortice sublignoso, 7-locularis, loculis amplis triangularibus polyspermis. *Semina* subellipsoidea, 1-1.5 cm. longa, 8 mm. lata, compressa.

ANGLO EGYPTIAN SUDAN. Mongalla Province: Lado, Yei River, 23 October, 1919 (fruit), *F. Sillitoe* 303:—Small tree, very spinous, no flowers.

UGANDA. Bunyoro District: Siba Forest, on forest edge, May 1936 (flowers). *W. J. Eggeling* 3006 (type):—A spiny bush 4 m. high; spines straight and sharp, leaves and flower buds gland-dotted, flowers whitish green with 3 or 4 petals. Budongo, spiny shrub on forest edge, November, 1935 (fruit), *W. J. Eggeling* 2310:—Leaves gland-dotted, fruit pear-shaped, woody, very like that of *Balsamocitrus Dawei* inside, and with a similar though less strong odour.

#### OLEACEAE.

***Linociera latipetala*** *M. R. F. Taylor*, sp. nov. [Oleaceae]; ab omnibus speciebus africanis pedunculis et pedicellis longioribus valde patentibus, lobis corollae latioribus facile distinguenda.

*Arbor* vel *frutex* scandens, valde ramosus, usque 13 m. altus. *Ramuli* glabri, plus minusve teretes, rigidi, patentes, cortice pallide

griseo-brunneo. *Folia* opposita; petiolus 5–6 mm. longus, basin versus dilatatus, supra canaliculatus; lamina coriacea, elliptica vel anguste obovata, basi sensim angustata, apice caudata, 10–13.5 cm. longa, 3–5.5 cm. lata, utrinque glabra, margine integra, costa et nervis supra impressis subtus prominentibus, nervis lateralibus utrinsecus 4–8 procul a margine arcuatim confluentibus; domatia saepe in axillis nervorum lateralium obvia. *Inflorescentiae* paniculatae, ex axillis foliorum pedunculatae, patentes, 7–13-florae; pedunculi glabri, flexuosi, usque 7 cm. longi; bracteae usque 1 mm. longae, ovatae, villosa-pubescentes; pedicelli 1–2 cm. longi, valde patentes, apicem versus sensim dilatati, saepe bibracteolati, bracteolis ovatis minutis. *Flores* intus flavo-albidi, extra pallide rosei; alabastra late ovoidea, sparse pubescentia. *Calyx* tenuiter cupuliformis vel patelliformis, extra leviter pubescens, crassus, lobis 4 patentibus latissime triangulatis 0.5–1 mm. longis 2–2.5 mm. latis. *Corolla* 4-lobata; lobi induplicato-valvati, alternatim altius et brevius connati, itaque sinus oppositi duo altiores duo breviores, subcarnosi, ovati vel elliptici, apice obtusi vel acuti, 7–8 mm. longi, 4–5 mm. lati. *Stamina* 2; filamenta compressa, circiter 2 mm. longa, inter corollae lobos altius connatos inserta; antherae reniformes, 2 mm. longae. *Ovarium* glabrum, biloculare, subglobosum, in stylum sensim attenuatum, 1.5–2 mm. altum, 1–1.5 mm. diametro; ovula pro loculo 1–2; stylus crassus, profunde 4-sulcatus vel subalatus, 1–1.5 mm. longus; stigma subcapitatum, demum mitriforme, 0.5 mm. longum, sparse pubescens. *Drupae* anguste ovoideae vel ellipsoideae, 1-loculae, usque 1.5 cm. longae, 1 cm. diametro, coccineae, stylis persistentibus. *Semen* 1.

UGANDA. Ankole district: Lake Lutoto, west of Ankole, at water's edge, August 1936, *W. J. Eggeling* 3186 (type):—climber or scandent bush; flowers with 4 petals, sub-fleshy, white-yellow within, pink outside. Bagube, in forest swamp, 1300 m., September, 1922, *R. A. Dummer* 5478:—evergreen tree, 8 m. high; flowers yellowish; rare.

KENYA. Kericho forest, 2330 m., *E. Battiscombe* 1303 (fruiting material):—a small tree, 6 m. high; fruits bright red, no flowers seen; only one specimen seen.

TANGANYIKA. Arusha district: South slope of Mt. Kilimanjaro between Umbwe and Weu Weru rivers, in Macaranga-Maesa forest at 1900 m. 1st September, 1932, *P. J. Greenway* 3222:—a much branched evergreen tree up to 19 m. high, with green flowers; not common.

#### ASCLEPIADACEAE.

***Asclepias pauciflora*** (Klotzsch) *E. A. Bruce*, comb. nov.—*Gomphocarpus pauciflorus* Klotzsch in Peters, Reise Mossamb. Bot. 276 (1861). *Stathmostelma pauciflorum* (Klotzsch) K. Schum. in Engl. Jahrb. 17, 132 (1893). *S. reflexum* Britten et Rendle in Trans. Linn. Soc. ser. 2, 4, 27, t.6, figs. 4–6 (1894). *Asclepias reflexa* (Britten et Rendle) [Britten et Rendle (1894), nomen provisor.] N.E. Br. in Fl. Trop. Afr. 4, pt. 1, 344 (1902).



**Pentas pseudomagnifica** *M. R. F. Taylor*, sp. nov. [Rubiaceae]; a *P. longituba* K. Schum. habitu graciliore, foliis minoribus manifesto longius petiolatis subtus nervis tantum asperiuscule pilosis, stipulorum fimbriis tenuissimis, calycis dentibus sursum spatulato-ampliatitis vel interdum subfoliaceis haud subulatis, corollae tubo manifesto brevior, lobis minoribus satis distincta.

*Frutex* vel *suffrutex*, ramosus, usque 1 m. altus; caules teretes, breviter griseo- et crispato-subtomentelli, internodiis superne circiter 2-5 cm. longis. *Folia* petiolata, petiolo 0.5-1 cm. longo asperulo-pubescente; lamina anguste ovata, superne sensim angustata vel acuminata, apice acuta, basi cuneata, 4-8 cm. longa, 1.5-2.5 cm. lata, supra leviter asperulo-pilosa, subtus praesertim in costa et nervis lateralibus asperiuscule pilosa, nervis lateralibus subtus prominentissimis utrinsecus 7-11; stipulae breviter connatae, inter petiolos in lobos 4-6 usque 1.5 cm. longos apice glandulosos tenuissime filiformes divisae. *Cymae* terminales, e basi 3-ramosae subtomentellae, 1.5-4 cm. longae, apice irregulariter breviter ramulosae, 2-4-florae. *Flores* pentameri, albi, subsessiles vel breviter pedicellati, pedicellis usque 0.5 cm. longis. *Calyx* (receptaculo incluso) campanulatus, molliter pubescens; tubus 4-5 mm. longus, 3-4 mm. diametro, apice inter lobos glandulis 1-3 parvulis ornatus; lobi 5, spatulato-ampliatii vel subfoliacei, apice acuti, 1-1.7 cm. longi et usque 5 mm. lati. *Corolla* longissime tubulosa; tubus 10-13 cm. longus, circiter 2 mm. diametro, sursum leviter dilatatus, extra pilis griseis crispato-subtomentosus, intus fauce et parte dilatata plus minusve dense et longe villosus, deorsum glabrescens et longitudinaliter striatus; lobi 5, patentes, anguste ovati, subacuti, 1-1.5 cm. longi, 5-7 mm. lati, extra pubescentes, intus glabri. *Stamina* 5, in parte tubi dilatata inclusa; antherae lineares, basi sagittatae, basin versus dorsifixae, subsessiles, glabrae, 8-8.5 mm. longae. *Ovarium* biloculare, placentis peltatis. *Stylus* 11-14 cm. longus, usque 1 cm. longus exsertus, superne lepidoto-puberulus, inferne glabrescens, apice stigmatosus, dilatatus, bilobatus, lobis 1.5 mm. longis. *Capsula* non visa.

TANGANYIKA TERRITORY. Morogoro District: Uluguru Mts., Lupanga Peak, 2060 m., 10 Dec. 1933, *B. D. Burtt* 4979 (type):—Secondary shrub on mountain summit with handsome white tubular flowers. Same locality, 2340 m., 26 Dec. 1931, *B. D. Burtt* 3480:—shrubby herb with dark green foliage and long tubular white flowers, rare. Same locality, near summit, 2330 m., 23rd Dec. 1933, *A. P. G. Michelmores* 857. Lukwangule Plateau, on the edge of mountain forest, 2400 m., 28 Nov. 1898, *W. Goetze* 258 (in *Herb. Berol.*):—subshrub about 1 m. high with white flowers reddish on the outside. Same locality, in grassland on plateau, 2660 m., 30 Jan. 1935, *Miss E. M. Bruce* 701:—0.5-1 m. shrub with showy white flowers, occasional.

All the specimens cited possess long-styled flowers, but doubtless heterostyly exists in this species as in the closely allied *P. graniticola* E. A. Bruce, of which both long- and short-styled specimens are preserved in the Kew Herbarium.

***Pentas longituba*** K. Schum. var. ***magnifica*** (Bullock) Bullock et M. R. F. Taylor, stat. nov. *P. magnifica* Bullock in Hook. Ic. Pl. t. 3265 (1935).

The description of this plant as a new species was due to a specimen (Goetze 852) in the Kew Herbarium from the Livingstone Mtns., having been wrongly labelled "*P. longituba*" by K. Schumann. Examination of the type of *P. longituba* (Holst 418), kindly sent on loan to Kew from Berlin, reveals that although *P. magnifica* is slightly different in facies and in various minor floral details, the differences are not sufficient to warrant specific distinction. This species is accordingly reduced to varietal rank. The Goetze specimen has now been identified as *P. nobilis* S. Moore (Journ. Bot. **46**, 37 : 1908).

***Vangueriopsis*** (§ Calycophyllae) ***Sillitoei*** Bullock, sp. nov. [Rubiaceae]; a *V. discolori* (Benth.) Robyns inflorescentiis multo majoribus pedunculis satis crassis multo longioribus, calycis lobis minoribus haud foliaceis, corollae tubo brevioris recedit.

*Frutex* scandens, ut videtur inermis. *Rami* annotini teretes, internodiis 6–7 cm. longis, cortice rubro-brunneo, parce lenticellato, hornotini glabrati, interdum pilis strictis adpressis levissime strigosi. *Stipulae* subpersistentes, e basi latiuscula 2 mm. vaginatim connatae, subulatae, extra glabrae, intus villosae, caudis carinatis 6–8 mm. attingentibus terminatae. *Folia* petiolata, discoloria, anguste oblongo-elliptica, 6–8 cm. longa, usque 2.5 cm. lata, apice late cuspidata, basi subacuta, supra viridia et pilis strigosis levissime oblecta, subtus albicantia et costa nervisque tantum similiter strigosa, nervis venisque subtus reticulatis; petioli 5–8 mm. longi. *Cymae* divaricatae, ex axillis foliorum delapsorum ortae, dichasia-liter ramosae, multiflorae; pedunculi 2.5–3 cm. longi, ramis primariis 1–2 cm. longis, glabri vel pilis paucis levissime strigosi; bracteae deciduae, lineari-oblongae, 1–1.5 mm. longae vel minores. *Calyx* (hypanthio incluso) cupuliformis vel obconicus, circiter 1.5 mm. longus, limbo brevissimo subtruncato vel 5-denticulato, denticulis late triangularibus. *Corolla* alba; tubus cylindricus, 3 mm. longus, fauce villosus, ceterum glaber; lobi 5, ut videtur sub anthesi reflexi, triangulares, circiter 2 mm. longi, apice acuti, cucullati. *Stamina* fauce inserta, filamentis filiformibus brevissimis; antherae exsertae, reflexae, oblongae, apice brevissime acute appendiculatae, basi thecis sagittato-divergentibus. *Stylus* filiformis, 4.5 mm. longus, basi leviter bulboso-expansus; stigma exsertum, capitato-mitriforme, 1 mm. longum, apice bilobum. *Discus* carnosus, annularis. *Ovarium* parvum, vix 1 mm. longum. *Fructus* valde immaturi globosi, maturi non visi.

ANGLO-EGYPTIAN SUDAN. Yei River, Lado, *Sillitoe* 377 :— Strong scandent shrub ; [flowers] white.

Although the available material of this species is poor, it has been described with a view to its inclusion in a check-list of Sudanese trees and shrubs now in course of preparation by Major G. Aylmer, lately of the Sudan Forestry Department. It constitutes a new generic record for the Sudan, its nearest ally, *V. discolor* (Benth.) Robyns, being confined to West Tropical Africa, where it is found in Sierra Leone, French Guinea, and Ivory Coast.

*Vangueriopsis discolor* and *V. Sillitoei* differ from all other species of the genus in their discolorous leaves, which are markedly reticulate on the lower surface, and they may constitute a distinct genus intermediate between *Rytigynia* Blume and *Vangueriopsis* Robyns. Other species of the section *Calycophyllae* Robyns\* seem to be more or less intermediate between *Vangueriopsis* and *Canthium* Lam.

#### COMPOSITAE.

**Erlangea** (Bothriocline) **auriculata** M. R. F. Taylor, sp. nov. (Compositae-Vernonieae) ; ab *E. amplexicaula* Muschler habitu elatiore, foliis siccitate nigrescentibus auriculatis lanceolatis majoribus, inflorescentiis laxius dispositis capitulis campanulatis differt ; ab *E. imatongensi* M. R. F. Taylor omnibus partibus majoribus, foliis auriculatis, involucri bracteis omnibus paleaceis exterioribus dense villosis valde distincta.

*Herba* lignosa vel suffrutex usque 4 m. altus. *Rami* patentes, teretes, leviter sulcati, apicem versus plus minusve dense flavo-brunneo-villosi, internodiis parte superiore 4-6 cm. longis. *Folia* opposita, decussata, sessilia, basi dilatata, connata ; lamina lanceolata, basi auriculata, apice sensim acuta, 10-15 cm. longa, 3.5-5 cm. lata, supra in statu sicco suffusco-nigra leviter villosa demum glabrescens, costa dense flavido-villosa, subtus dense flavido- vel griseo-tomentosa, margine irregulariter dentato-serrata, nervis lateralibus numerosis arcuantibus. *Inflorescentia* terminalis vel axillaris, valde ramosa, paniculato-corymbosa ; rami patentes, teretes, dense flavido-brunneo-villosi, bracteati ; bractee foliis subsimiles sed minores ; capitula subsessilia, 2-6 in glomerulis pedunculatis disposita ; pedunculi 3-9 mm. longi. *Capitula* campanulata, circiter 6 mm. longa, 3 mm. diametro, floribus 12-15 instructa. *Involucri bractearum* 3-4-seriatae, imbricatae, omnino paleaceae ; bractee exteriores ovato-lanceolatae vel late lanceolatae, 2.5-4 mm. longae, 1-2 mm. latae, apice acutae, dense flavido-villosae vel apicem versus villosae ; interiores late lanceolatae vel lineares, 4-5 mm. longae, 1.75-0.5 mm. latae, apice acutae vel acuminatae, interdum leviter reflexae, glabrae. *Corollae* ex involucrio exsertae, pallidissime purpureae, circiter 6 mm. longae ; tubus infundibuliformis, 3.5-4 mm. longus ; lobi lineares, 2-2.5 mm. longi, acuti. *Filamenta* 1 mm. longa. *Antherae* vix exsertae,

\* Robyns in Bull. Jard. Bot. Brux. 11, 248 et seq. (1928).

1.75 mm. longae, basi rotundatae, apice acuminatae, membranaceae. *Stylus* cum stigmatē usque 8 mm. longus; lobi stigmati circiter 2 mm. longis, subulatis, adpresse sericeo-pubescentibus. *Achaenia* *matura* turbinata vel oblonga, crassa, glabra, angulata, 1.25 mm. longa, 0.5–0.75 mm. lata, 7–9-costata, costis laevibus flavidis prominentibus, regionibus inter costas glandulis minutis brunneis obsitis. *Pappus* e setis 10–12 circiter 2 mm. longis stramineis erectis rigidis barbellatis caducissimis sistens.

UGANDA. Bugishu District. Mt. Elgon, from open forest above Bulambuli camp, 3260–3500 m., 1930, L. C. C. Liebenberg 1584 (type):—when supported by other vegetation the stems grow up to 3.5 m.; flowers very light purple. Mt. Elgon, bamboo zone, 3000 m., Jan. 1918. R. A. Dummer 3563:—Occasional; up to 1.5 m., flowers lilac. Bulambuli, upper forest zone, 3260 m., 6 Sept. 1932, A. S. Thomas 653:—Very common; shrub, 4 m., spreading; flowers mauve, in large umbels. Bulambuli, just below bamboo zone, 3000 m. 12 Nov. 1933. B. H. Tothill 2330:—Occasional; few in bloom; coarse herb. 3 m. high, flowers mauve.

**Erlangea** (Bothriocline) **imatongensis** M. R. F. Taylor, sp. nov. [Compositae-Vernonieae]; ab *E. amplexicauli* Muschler omnibus partibus fere glabris, foliis siccitate saepe nigrescentibus minoribus haud tomentosis, involucri bracteis reflexis valde distincta.

*Herba* lignosa, usque 2 m. alta. *Rami* erecti, subteretes, sulcati, apicem versus sparse sericeo-villosi, inferne demum glabrescentes, internodiis 1–2 cm. longis. *Folia* opposita, decussata, sessilia vel subsessilia, basi valde dilatata, connata; lamina ovato-lanceolata vel lanceolata, basi subamplexicaulis, apice acuta, 4.5–7 cm. longa, 2–3 cm. lata, supra saepe in statu sicco suffusco-nigra vel fusco-olivacea, glabra, subtus pallido-olivacea, nervis leviter villosa, margine dentato-serrata, dentibus apice saepe crassis; nervi laterales utrinsecus 10–14, leviter arcuati, venis dense reticulatis. *Inflorescentia* terminalis, corymbosa, valde ramosa; rami patentes, angulati, dense sericeo-villosi, bracteati; bractee foliis subsimiles sed minores; capitula 3–6 in glomerulis fasciculatis spissis disposita. *Capitula* 8–12-flora, subcylindrica, 4–6 mm. longa, 2.5–3 mm. diametro. *Involucri bractee* 3–4-seriatae, imbricatae, pallide virides, demum paleaceae; bractee exteriores ovatae, 1.5–2 mm. longae, 0.75–1.25 mm. latae, margine scariosae, sparse tomentosae; interiores ovato-lanceolatae vel lanceolatae, 3–4 mm. longae, 1–1.6 mm. latae, apice obtusae vel acutae, reflexae, margine late scariosae, apicem versus saepe minute serratae, glabrae. *Corollae* ex involucrio leviter exsertae, pallide purpureae, basin versus sparsissime piloso-glandulosae, 4.5–5 mm. longae; tubus apicem versus ampliatus, circiter 3 mm. longus; lobi lineares, circiter 1.75 mm. longi, obtusi. *Filamenta* circiter 1.5 mm. longa. *Antherae* vix exsertae, 1.5 mm. longae, apice acutae, membranaceae, basi rotundatae. *Stylus* cum stigmatē usque 6 mm. longus; lobi stigmati circiter 1 mm. longi, filiformes, adpresse sericeo-pubescentes.

*Achaenia* matura turbinata vel oblonga, crassa, glabra, angulata, 1.5–2 mm. longa, 1–1.25 mm. lata, 8–10-costata, costis laevibus flavidis prominentibus, regionibus inter costas glandulis minutis brunneis obsitis. *Pappi setae* 20–25, rigidae, 1.5–2 mm. longae, barbellatae, caducae.

ANGLO-EGYPTIAN SUDAN. Imatong Mountains : Kippia, common in ravines, about 2916 m., 11 Febr. 1929, *T. F. Chipp* 92 (type) :—heliotrope flowered composite, 2 m. high. Rocky summit of Mt. Kineti, 330 m., 30 Dec. 1935, *A. S. Thomas* 1836 :—Abundant in scrub : subshrubby, height 1 m., flowers mauve. Mongalla, 1 Jan. 1936, *H. B. Johnston* 1449. No locality, 2330 m., 10 Febr. 1936, *H. B. Johnston* 1485. No locality, 3163 m., 12 Febr. 1936, *H. B. Johnston* 1522. No locality, 2633 m., 10 Febr. 1936, *H. B. Johnston* 1532.

***Pentzia schistostephioides*** *M. R. F. Taylor*, sp. nov. [Compositae]; a *P. sabulosae* (Wolley-Dod) Hutch. habitu erecto, regione florifera tantum ramosa, omnibus partibus lanato-tomentosis, foliis saepe bipinnatisectis siccitate marginibus revolutis, capitulis minoribus numerosioribus, pappi squamis linearibus inter se distinctis facile distinguenda.

*Herba* perennis, aromatica, basi lignosa, erecta, usque 2 m. alta, apicem versus (regione florifera) ramosa; caules crassi, teretes, longitudinaliter striati, griseo- vel albido-lanati, internodiis 1–2 cm. longis. *Folia* ambitu ovata vel late lanceolata, 3–7 cm. longa, 1–4 cm. lata, pinnatisecta, utrinque lanato-tomentosa, infra costa et nervis lateralibus prominentibus, basi auriculata, segmentis utrinsecus 4–7 oppositis 3–7-lobatis, lobis ultimis oblongis apice rotundatis 1-nerviis marginibus integris valde revolutis. *Inflorescentiae* terminales, compactae, corymbosae, capitulis numerosis; rami inflorescentiarum crassi, dense lanati, ex axillis foliorum valde redactorum orti, et bracteis foliaceis paucis integris 3–5 mm. longis praediti; pedunculi graciles, 2–4 mm. longi, apice ramorum dense conferti. *Capitula* subglobosa, circiter 4 mm. alta et 5 mm. lata, discoidea, homogama, flava. *Involucri bractee* 3–4-seriatae, imbricatae; exteriores 1 mm. longae, lineares, paucae; intermediae 2–2.5 mm. longae, lineari-lanceolatae, acutae, marginibus scariosis laciniatis; interiores oblongae vel spatulatae, 2–3 mm. longae, 0.5 mm. latae, obtusae, marginibus late scariosis nonnunquam laciniatis; receptaculum convexum, alveolatum. *Flores* circiter 70. *Corollae tubus* 2–2.5 mm. longus, inferne cylindricus et parce glandulosus, superne ampliatus, subcampanulatus vel campanulatus, glaber. *Corollae lobi* 5, carnosi, globosi, glabri, 0.25 mm. diametro. *Antherae* 1 mm. longae, basi rotundatae. *Stigmata* 0.2 mm. longa, truncata, crassa. *Achaenia* immatura 1–1.5 mm. longa, crassa, basin versus angustata, leviter costata, glabra; pappi squamae circiter 10, lineares, 0.25 mm. longae, uniseriatae, inter se distinctae.

S. RHODESIA. Inyanga, 2000 m., 19 October 1935, *F. Eyles* 8479 (type):—plant 5–6 ft., by water. Inyanga Downs, 1660–2000 m., September 1934, *F. Eyles* 7927.

This very distinct species extends the range of the genus, hitherto almost exclusively South African, to Southern Rhodesia. The erect, woody, almost unbranched stems, comparatively large deeply divided leaves and dense many-headed corymbs give it the appearance of the allied genus *Schistostephium*, hence the specific name. This species falls into the section *Corymbosae* (see Hutchinson in Kew Bulletin 1916, p. 241 et seq.).

**Pleiotaxis argentea** *M. R. F. Taylor*, sp. nov. [Compositae-Mutisiaeae]; a *P. arenaria* Milne-Redhead racemis haud axillaribus, capitulis majoribus, involucri phyllis majoribus acutis, foliis majoribus albo-tomentosis differt.

*Suffrutex* usque 1 m. altus. *Rami* divaricati, longitudinaliter striati, albido-araneo-tomentosi, inferne demum glabrescentes; internodiis 1–2 cm. longis. *Folia* alterna, sessilia, elliptica vel ovato-elliptica, basi amplexicaulia, apice obtusa vel acuta, 5–8 cm. longa, 2.5–4 cm. lata, supra rugosa, griseo-araneosa, praecipue secus nervos, infra dense albo-araneosa, margine dentata, dentibus interdum breviter callosospinosis; nervi laterales utrinsecus 10–14, venis dense reticulatis supra impressis et subtus prominentibus. *Capitula* 1–4 in racemos terminales disposita, subcylindrica, vix 3 cm. longa, circiter 1 cm. lata, breviter pedunculata, pedunculis 1–3.5 cm. longis, bracteis paucis lineari-lanceolatis circiter 8 mm. longis. *Involucri bracteae* 4–5-seriatae, imbricatae, apicem versus sanguineae vel purpureae, margine inconspicue scariosae; exteriores ovatae vel ovato-lanceolatae, 6–8 mm. longae, 3–4 mm. latae, basi crassae, apice acutae, dense araneo-tomentosae; interiores lanceolatae, usque 1.8 cm. longae, 4 mm. latae, apice scariosae acutae vel acuminatae, leviter tomentosae demum glabrescentes. *Corollae* exsertae, pallido-sanguineae; tubus 1.5 cm. longus, parte inferiore anguste cylindricus, parte superiore urceolatus, 2–3 mm. longus; lobi attenuati, 4 mm. longi, reflexi. *Stamina* apice partis tubi inflatae affixa; filamenta 2 mm. longa; antherae exsertae, 5 mm. longae, caudis 1 mm. longis villosis. *Ovarium* angustum, circiter 5 mm. longum, dense adpresso-sericeo-villosum; stylus circiter 1.8 cm. longus; stigmatis lobi obtusi, 1 mm. longi. *Achaenia* immatura 1 cm. longa. *Pappi setae* pallide fulvae, 1.2 cm. longae, barbellatae.

NORTHERN RHODESIA. Abercorn District: Lunzua Escarpment between Malombe and the Lunzua river, 2000 m., 2 June 1936, *B. D. Burtt* 6437 (type):—Among rocks of steep rocky escarpment clothed with *Brachystegia microphylla*. A pale-scarlet flowered bushy perennial herb 1 m. high, with silvery green leaves. Locally common near summit.

**Kleinia kleinioides** (*Sch. Bip.*) *M. R. F. Taylor*, comb. nov. [Compositae-Senecioneae]. *Notonia kleinioides* Sch. Bip. in

Schweinf. Fl. Aethiop. 151 (1867); *Senecio kleiniioides* Oliv. & Hiern. in Fl. Trop. Afr. 3, 421 (1877); *Kleinia violacea* A. Berger in Monatschr. Kakt. 15, 38 (1905).

#### BORAGINACEAE.

The type specimen of *Cordia unyorensis* Stapf (Dawe 798 from Uganda) described in Journ. Linn. Soc. 37, 527 (1906), has been carefully examined and proves to be a mixture. The leaves and flowering shoots belong to *Cordia abyssinica* R.Br., whilst the detached fruits are those of *C. Milleni* Baker. The name is therefore discarded and in part referred to the synonymy of these two species. That of *C. Milleni* Bak. has been enlarged to include the following species, which appear to be conspecific:—***Cordia Milleni* Bak.** in Kew Bull. 1894, 27. *C. longipes* Bak. l.c.; *C. chrysoclada* Bak. l.c.; *C. Irvingii* Bak. quoad *Dr. Rowland s.n.*, l.c. 1895, 113. *C. Liebrechtiana* De Wild. et Th. Dur. in Bull. Soc. Bot. Belg. 38, 38 (1899). *C. unyorensis* Stapf, quoad fruct. *C. Yombomba* Vaupel in Engl. Jahrb. 48, 526 (1912). *C. ugandensis* S. Moore in Journ. Bot. 54, 288 (1916).

E. A. B.

#### CONVOLVULACEAE.

***Ipomoea latisepala* E. A. Bruce**, sp. nov. [Convolvulaceae]; affinis *I. nephrosepalae* Chiov. sed foliis basi cordatis breviter pubescentibus, bracteolis late ovatis vel suborbicularibus majoribus differt.

*Suffrutex*; rami pallido-brunnei vel cinerei, leviter striati, apicem versus griseo-tomentosi, inferne pubescentes demum glabrescentes, basi circiter 5 mm. diametro; internodia 1–2 cm. longi; nodi basibus crassis petiolorum cicatricosis. *Folia* petiolata; petioli 1.5–3 cm. longus, tomentosus; lamina siccitate subflavescent, cordata vel ovato-cordata, basi late cordata, apice rotundata, 2–4 cm. longa, 1.5–4 cm. lata, utrinque tomentosa, margine integra vel leviter undulata; nervi laterales utrinsecus 4–6, supra impressi, subtus prominentes. *Flores* solitarii, in axillis foliorum superiorum pedicellati; pedicelli 1–1.5 cm. longi, dense tomentosi, apicem versus bracteolis duabus calycem includentibus; bracteolae membranaceae, late ovatae vel orbiculares, apice rotundatae nonnunquam apiculatae, basi brevissime unguiculatae, 1.2–1.8 cm. longae, 1.2–2 cm. latae, extra pubescentes, intus glabrae et conspicue venosae. *Calyx* membranaceus, usque ad basin 5-lobatus; lobi contorti, subaequales, transverse oblongo-elliptici, apice late rotundati vel subtruncati, basin versus angustati brevissime unguiculati, circiter 1 cm. longi et 1.5 cm. lati, extra sericeo-tomentosi, intus glabri et venosi. *Corolla* infundibuliformis, superne flava, inferne lilacina, 3–3.5 cm. longa, fauce 2–2.5 cm. diametro, alabastro sericeo-tomentoso, matura extra glabra cum vittis 5 pilosis circiter 4 mm. latis e basi ad apicem angustatis dentibus minutis terminatis. *Stamina* 5, 3–4 mm. supra basin corollae inserta; filamenta glabra, compressa, 1.2–1.3 cm. longa; antherae oblongae, 3.5 mm. longae,

basi breviter sagittatae. *Ovarium* hemisphaericum, 1.5 mm. altum, 2 mm. diametro, glabrum, disco annulari; stylus simplex, 1.2–1.4 cm. longus, per 2 mm. basin versus leviter ampliatus et basi supra ovarium constrictus; stigmata duo, globosa, vix 1 mm. crassa.

BRITISH SOMALILAND. Harradigit, 44° 31' E., 7° 45' N., 981 m., Nov. 1934, *Godding* 233 (type):—small plant with yellow-mauve flowers: vernacular name "Defao."

Material of *Jacquemontia capitata* (Desr.) G. Don from the type locality, Senegal, has been compared with material and with the type figure of *Jacquemontia tamnifolia* (L.) Griseb. from South Carolina, North America. It is considered that the African species is synonymous with *J. tamnifolia* (L.) Griseb. This latter was founded on the pre-Linnean species *Volubilis carolinensis*, *tamnifolio subhirsuto* in Dill. Hort. Elth. 428, t. 318, fig. 410 (1732). The synonymy is as follows:—*Jacquemontia tamnifolia* (L.) Griseb. Fl. Brit. W. Ind. 474 (1861). *J. capitata* (Desr.) G. Don, Gen. Syst. 4, 283 (1837). *J. capitata* (Desr.) G. Don var. *pauciflora* N.E. Br. in Dyer, Fl. Trop. Afr. 4, pt. 2, 86 (1905). *Ipomoea tamnifolia* L. Sp. Pl. 162 (1753). *I. guineensis* G. Don, Gen. Syst. 4, 269 (1837). *I. macropoda* Boj. Hort. Maur. 229 (1837). *I. capitata* Choisy in DC. Prodr. 9, 365 (1845). *Convolvulus capitatus* Desr. in Lam. Encycl. 3, 554 (1791). *C. tamnifolius* G. F. W. Mey. Prim. Fl. Esseq. 95 (1818). *C. guineensis* Schum. et Thonn. Beskr. Guin. Pl. 90 (1827). *C. pycnantha* Hochst. ex Choisy in DC. Prodr. 9, 365 (1845).

E. A. B.

#### SCROPHULARIACEAE.

*Sutera* Roth, Bot. Bemerk. 172 (1807).—There has been some slight confusion over this genus as it was reduced by Willdenow and later revived by Roth. In 1807 Roth<sup>1</sup> published the two species *Sutera foetida* and *S. brachiata*: the former was founded on *Buchnera foetida* Andr.<sup>2</sup> and is the type of the genus *Sutera*, the latter is a synonym of *Manulea hispida* Thunb.<sup>3</sup>, for which the new combination *Sutera hispida* (Thunb.) Druce<sup>4</sup> has been made. In 1809 Willdenow<sup>5</sup> reduced *Sutera* to *Manulea*, but twelve years later, in 1821, Roth<sup>6</sup> revived the genus and added another species *Sutera glandulosa* Roth. This species is, however, synonymous with *Capraria dissecta* Del.<sup>7</sup> and the new combination *Sutera dissecta* (Del.) Walp.<sup>8</sup> was made. In 1836 Bentham<sup>9</sup> founded three new genera, *Chaenostoma*, *Lyperia* and *Sphenandra* and incorporated *Sutera foetida* and *Manulea hispida* in his genus *Chaenostoma*. In 1891 Kuntze<sup>10</sup> replaced Bentham's *Chaenostoma* into *Sutera* Roth (1807) and created a new genus, *Jamesbrittenia*<sup>10</sup>, for the species

<sup>1</sup>Roth, Bot. Bemerk. 172 (1807). <sup>2</sup>Andr. Bot. Rep. 2, t. 80 (1800). <sup>3</sup>Thunb. Prod. Pl. Cap. 102 (1800). <sup>4</sup>Druce, Rep. Bot. Exch. Cl. Brit. Isles, 1916, 649 (1917). <sup>5</sup>Willdenow, Enum. Plant. Hort. Berol. 653 (1809). <sup>6</sup>Roth, Nov. Pl. Spec. 291 (1821). <sup>7</sup>Del. Fl. Egypte, 95, t. 32, fig. 2 (1812). <sup>8</sup>Walp. Rep. 3, 271 (1844). <sup>9</sup>Benth. in Hook. Comp. Bot. Mag. 1, 374 (1836). <sup>10</sup>Kuntze, Rev. Gen. 461, 466 (1891).



founded on *Sutera glandulosa* Roth. In 1897 Diels<sup>11</sup> revived *Chaenostoma* but treated *Lyperia* and *Sphenandra* as sections of this genus. A few years later *Chaenostoma*, as conceived by Diels, was again reduced to *Sutera* by Hiern.<sup>12</sup> Hemsley and Skan<sup>13</sup> adhered to this arrangement, but still considered *Jamesbrittenia*, founded on *Sutera glandulosa*, to be a distinct genus. They separated this from *Sutera* on the character of the shortly two-lobed style. The type of *Jamesbrittenia* has been examined and the minutely bilobed style is present, but this is also present in *Sutera Elliotensis* Hiern, so cannot be taken as a separating generic character. There appear to be no characters on which *Jamesbrittenia* can be excluded from *Sutera* Roth 1807. *Sutera* Roth 1821 is therefore synonymous with *Sutera* Roth 1807 and the generic name *Jamesbrittenia* is not required and becomes a synonym :

***Sutera dissecta* (Del.) Walp. Rep. 3, 271 (1844).**

*Sutera glandulosa* Roth, Nov. Pl. Spec. 291 (1821).

*Capraria dissecta* Del. Fl. Egypte, 95, t. 32, fig. 2 (1812).

*Jamesbrittenia dissecta* Kuntze, Rev. Gen. 46 (1891).

E. A. B.

#### ACANTHACEAE.

***Hypoestes rosea* Beauv. Fl. Oware & Ben. 2, 66, t. 100 (1818) ;** Nees in DC. Prodr. 11, 506 (1847) ; Benth. in Hook. Niger Fl. 484 (1849), pro parte, quoad spec. Beauv. ; C. B. Cl. in Dyer, Fl. Trop. Afr. 5, 248 (1900), pro parte, excl. descr., quoad spec. Beauv. ; Hutch. & Dalz. Fl. W. Trop. Afr. 2, 268 (1931), excl. diagn., quoad spec. ex Benin. *H. Barteri* T. Anders. in Journ. Linn. Soc. Bot. 7, 49 (1864) ; Lindau in Engl. & Prantl, Pflanzenfam. 4, 313, 333 (1895) ; C. B. Cl. in Dyer, Fl. Trop. Afr. 5, 246 (1900) ; S. Moore in Cat. Pl. Talb. Nig. 141 (1913) ; Hutch. & Dalz. Fl. W. Trop. Afr. 2, 268 (1931).

When Anderson enumerated the African species of *Hypoestes* he failed to mention *H. rosea* Beauv. whilst he described a new species based on a specimen collected by Barter, which he named *H. Barteri*. Apparently Clarke never saw Beauvois' specimen of *H. rosea*, for he misidentified it with *H. consanguinea* Lindau. He also identified a specimen in the Natural History Museum Herbarium collected by Don in São Thomé as *H. rosea*.

Comparison of Don's specimen with *Preuss* 599, the type specimen of *H. consanguinea* Lindau, showed the former to be a distinct species. In order to try to settle its identity, the type specimen of *H. rosea* Beauv. was examined. This was found to be identical with *H. Barteri* T. Anders., which name becomes a synonym of *H. rosea*. The name *H. consanguinea* Lindau is restored to the species based on *Preuss* 599, but the specimen from São Thomé, being rather scanty, has not yet been identified.

E. M-R.

<sup>11</sup>Diels in Engl. Jahrb. 23, 492 (1897). <sup>12</sup>Hiern in Dyer, Fl. Cap. 4, pt. 2, 243. <sup>13</sup>Hemsley et Skan in Dyer, Fl. Trop. Afr. 4, pt. 2, 298, 299 (1906).

**Barleria (Somalia) Phaylopsis** *Milne-Redhead*, sp. nov. [Acanthaceae]; a *B. diffusa* (Oliv.) Lindau habitu herbaceo nec suffruticoso, foliis multo majoribus cystolithiis instructis, inflorescentiis substrobiliformibus differt.

*Herba* perennis, caulibus pluribus decumbentibus e caudice ortis; caules simplices vel interdum perpauca ramis axillaribus basin versus instructi, usque 25 cm. longi, setoso-hirsuti, ad nodos flexi, internodiis 2–6 cm. longis. *Folia* oblanceolata, apice subobtusata, basi attenuata, sessilia, usque 9 cm. longa, 2.8 cm. lata, costa et margine setoso-hirsuta, ceterum glabra, utrinque cystolithiis inspersis instructa. *Inflorescentiae* ut videtur terminales, substrobiliformes, cymis 1-floris ex axillis foliorum superiorum redactorum exortis; folia superiora usque 12 mm. longa, 2.5 mm. lata, redacta, glandulosa; bractae oppositae, lanceolatae, apice subacutae, basi attenuatae, circiter 10 mm. longae, dense glandulosae. *Calyx* usque ad basin 4-partitus, pilis glandulosis et eglandulosis intermixtis hirsutus; segmentum posticum lanceolatum, acutum, 13 mm. longum, 2.5 mm. latum, trinerve; anticum alte bifidum, 12 mm. longum, 2.2 mm. latum, binerve; segmenta lateralia lineari-subulata, 10.5 mm. longa, 0.8 mm. lata. *Corolla* lilacina, 19 mm. longa; tubus cylindricus, 10 mm. longus; segmenta subsimilia, obovata; segmentum anticum apice emarginatum, 7 mm. latum; duo postica 3.5 mm. lata; duo lateralia 5.5 mm. lata. *Stamina* 2, circiter 3 mm. a basi tubi affixa; filamenta filiformia, 10 mm. longa; antherae biloculares, loculis lineari-oblongis 2.5 mm. longis leviter divergentibus; staminodia plus minusve obsoleta. *Ovarium* oblongum, 2.5 mm. altum, puberulum, apice in stylum filiformem 9.5 mm. longum apice integrum anguste attenuatum, 4-ovulatum, ovulis duobus inferioribus abortivis minutis; discus minutus. *Capsula* puberula, 12 mm. longa, superne in rostrum 6 mm. longum contracta.

NORTHERN RHODESIA. Solwezi District: in *Brachystegia* woodland by the Mbulungu Stream west of Mutanda Bridge, 9 July 1930, *Milne-Redhead* 690:—Tufted perennial; flowers lilac, with or without markings.

#### LABIATAE.

**Acrocephalus** (*Acrocephalus* § *Holochili*) **speciosus** *E. A. Bruce*, sp. nov. [Labiatae]; affinis *A. tuberoso* Robyns et Lebrun sed capitulis paucioribus majoribus cylindricis, foliis et caulibus dense albido- vel stramineo-pilosis differt.

*Herba* perennis, erecta, circiter 7.5 dm. alta; caules erecti, sublignosi, parce ramosi, rigidi, sulcati, basi circiter 5 mm. diametro, dense adscendente albido- vel stramineo-pilosi apicem versus densius, internodiis 4–7 cm. longis. *Folia* sessilia vel subsessilia, opposita, lanceolata vel oblongo-lanceolata, basi late cuneata, apice acuta vel subacuta, 4–10 cm. longa, 1–3 cm. lata, margine crenulata, utrinque praesertim nervis parce pilosa, nervis lateralibus utrinsecus circiter

10 supra impressis subtus valde prominentibus. *Capitula* terminalia et caules laterales terminantia, cylindrica, usque 9 cm. pedunculata, 1.5–3 cm. longa, circiter 1.5 cm. diametro, multiflora; bracteae exteriores viridescentes, foliis similes sed minores; bracteae interiores ovato-cordatae, basi late cordatae, apice caudato-acuminatae, extra pilosae, intus glabrae, margine piloso-ciliatae, usque 1.4 cm. longae et 1.2 cm. latae. *Flores* vulgo 3 pro bractea. *Calyx* bilabiatus; tubus campanulatus, 1.5 mm. longus, extra pilis albidis longissimis sericeis usque 5 mm. longis dense indutus, intus glaber; lobus anticus lanceolatus, usque 2 mm. longus, apice acutus; lobus posticus semi-orbicularis, circiter 0.8 mm. longus, apice subtruncatus vel late rotundatus. *Corolla* exserta, usque 9 mm. longa; tubus anguste cylindricus, faucem versus leviter dilatatus, usque 7 mm. longus, basi 1 mm. fauce 2 mm. diametro; labium anticum integrum, ovato-ellipticum, vix 2 mm. longum, apice acutum; labium posticum trilobatum, lobis lateralibus ovato-triangularibus 1 mm. longis, lobo medio obovato 1.5 mm. longo, omnibus ciliatis. *Stamina* infra faucem inserta, demum exserta, filamentis 4 mm. longis, antheris subrotundatis; stylus minute bifidus, circiter 7 mm. longus.

NORTHERN RHODESIA. Abercorn District: Near Issoko, 1050 m., 27 Oct. 1936, *B. D. Burt* 6100 (type):—In clumps in hilly *Brachystegia* country. Abercorn Lake, 1500 m., 19 July 1930, *Hutchinson & Gillett* 3881:—7.5 dm. high.

***Iboza multiflora* (Benth.) E. A. Bruce**, comb. nov.—*Plectranthus multiflorus* Hochst. ex Benth. in DC. Prodr. 12, 49 (1848), nomen. *Moschosma multiflorum* Benth. l.c.

***Iboza urticifolia* (Baker) E. A. Bruce**, comb. nov.—*Moschosma urticifolium* Baker in Dyer, Fl. Trop. Afr. 5, 353 (1900).

## VIII—RESEARCHES ON *SILENE MARITIMA* AND *S. VULGARIS*: XXV.\*

E. M. MARSDEN-JONES AND W. B. TURRILL.

INVESTIGATIONS OF PLANTS FROM FEARNAN, LOCH TAY,  
SCOTLAND.

In August, 1929, we received through Prof. K. W. Braid seeds of *S. vulgaris* collected near Fearnan, on the shore of Loch Tay, by Mr. D. A. Haggert. The following information was received from the collector: "It is mixed seed of red and white plants. The plant is still in good form at Fearnan though the white now predominates. When I first discovered it the shore plant was almost all red-purple. The white is now more common."

Amongst the plants raised from this seed, and in the families obtained by selfing certain of them, were white and coloured flowered individuals. These have been classified into four groups as follows:

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\* Continued from K.B. 1939, 473.

*Dark*: upper surface of petals Laelia Pink, lower surface Tourmaline Pink (Ridgway Pl. xxxviii).

*Medium*: upper and lower surface Pale Laelia Pink, lower surface with veins Tourmaline Pink.

*Pale*: upper and lower surface very dilute Pale Laelia Pink, lower surface in veins Pale Laelia Pink.

*White*: with no trace of colour.

All the plants dealt with in this paper come within the species *S. vulgaris* and all died down completely to ground level for a typical hemicryptophytic winter condition.

Three of the plants from the original wild seed (grown at Potterne under the symbol L.1) were chosen as stock plants and are described below.

**B.37.** *Habit*: compact, stems erect, up to 4.6 dm. long; with medium anthocyanin in vegetative parts; glabrous; not strict.

*Leaves*: narrow lanceolate, averaging for well developed leaves 5 cm. long, 1.5 cm. broad, glabrous, margins not ciliated but sometimes minutely crenulate.

*Inflorescence and sex*: with up to 15 flowers; flowers zygomorphic; bracts at first green herbaceous many becoming later scarious, ciliated; hermaphrodite.

*Calyx*: subinflated with medium anthocyanin.

*Corolla*: with petals bilobed, divided  $\frac{3}{4}$  length of lamina, petals and segments not contiguous or overlapping, 1.9 cm. long, 8 mm. broad, boss, blotch present, colour medium.

*Filaments*: purple; anthers purple.

*Stigmata*: purple; immature seeds white.

*Mature capsules*: ovoid-ellipsoid, 7 mm. long (excluding teeth), 6.5 mm. diam., teeth 1.5 mm. long, erect, mouth 2 mm. diam., carpophore 2 mm. long, 2 mm. diam.

*Mature seeds*: tubercled.

**B.38.** *Habit*: compact, stems erect, up to 6.2 dm. long; with medium anthocyanin in vegetative parts; glabrous; not strict.

*Leaves*: narrow oblanceolate to lanceolate, averaging for well developed leaves 5.5 cm. long, 1.8 cm. broad, glabrous, margins ciliated.

*Inflorescence and sex*: with up to 34 flowers; flowers zygomorphic; bracts as for B.37; hermaphrodite.

*Calyx*: subinflated, with medium anthocyanin.

*Corolla*: with petals bilobed, divided  $\frac{3}{4}$  length of lamina, petals and segments not contiguous or overlapping, 1.7 cm. long, 8 mm. broad, boss, blotch absent, colour pale.

*Filaments*: purple; anthers purple.

*Stigmata*: purple; immature seeds white.

*Mature capsules*: ovoid-ellipsoid, 7 mm. long (excluding teeth), 7 mm. diam., teeth 1.5 mm. long, erect, mouth 2 mm. diam., carpophore 2 mm. long, 2 mm. diam.

*Mature seeds*: armadillo.

**B.39.** *Habit* : spreading and ascending, stems up to 5.5 dm. long ; with much anthocyanin in vegetative parts ; glabrous ; semi-strict.

*Leaves* : lanceolate to linear lanceolate, averaging for well developed leaves 6.5 cm. long, 1.7 cm. broad, glabrous, margins more or less ciliated.

*Inflorescence and sex* : with up to 15 flowers ; flowers zygomorphic ; bracts as for B.37 ; hermaphrodite.

*Calyx* : subinflated, with medium anthocyanin.

*Corolla* : with petals bilobed, divided  $\frac{3}{4}$  length of lamina, petals and segments not contiguous or overlapping, 2 cm. long, 8 mm. broad, small scale, blotch absent, colour pale.

*Filaments* : purple, anthers purple.

*Stigmata* : purple ; immature seeds white.

*Mature capsules* : ovoid-ellipsoid, 6.5 mm. long (excluding teeth), 6.5 mm. broad, teeth 1.5 mm. long, erect, mouth 2 mm. diam., carpophore 2 mm. long, 1.5 mm. diam.

*Mature seeds* : armadillo.

The  $F_1$  and  $F_2$  families derived from these stock plants, after controlled pollinations, have been designated as follows :

N.120=B.39 selfed.

N.267=N.120 plant 3 selfed.

N.285=N.120 plant 1 selfed.

N.286=N.120 plant 4 selfed.

N.121=B.37 selfed.

N.311=N.121 plant 6 selfed.

N.122=B.38 selfed.

**N.120=B.39 selfed.** 60 plants in the family.

*Habit* : for all plants spreading and ascending ; stems up to 6.1 dm. long ; with much anthocyanin in vegetative parts ; glabrous ; mat ; 8 strict : 34 semi-strict : 18 not strict.

*Leaves* : as in parent.

*Inflorescence and sex* : with up to 23 flowers ; flowers zygomorphic, 38 hermaphrodite : 1 hermaphrodite and female : 10 female.

*Calyx* : plants segregated for inflated, subinflated, and narrow calyces, but owing to bad attacks of *Marssonina* a large majority of the plants could not be scored for calyx shape ; 34 medium anthocyanin : 10 little anthocyanin.

*Corolla* : petals all bilobed, with  $\frac{3}{4}$  lobing ; all petals and segments not overlapping or contiguous ; all with no anthocyanin blotch ; 45 with small scale : 4 with boss ; colour 2 dark : 18 medium : 15 pale : 12 white.

*Filaments* : all purple (when present) ; anthers all purple (when present).

*Stigmata* : all purple ; immature seeds all white.

*Mature capsules* : all of *vulgaris* type.

*Mature seeds* : all armadillo.

N.267=N.120 plant 3 selfed. 17 plants in the family.

*Habit*: for all plants spreading and ascending; stems up to 7.8 dm. long; with much anthocyanin in vegetative parts; glabrous; mat; all not strict.

*Leaves*: as in parent.

*Inflorescence and sex*: with up to 48 flowers; flowers zygomorphic; 13 hermaphrodite : 1 hermaphrodite and female : 3 female.

*Calyx*: 2 inflated : 10 subinflated : 5 narrow; all with medium anthocyanin.

*Corolla*: petals all bilobed, with  $\frac{3}{4}$  lobing; all petals and segments not overlapping or contiguous except for slight overlapping in one plant; anthocyanin blotch 1 present : 16 absent; 13 with scale : 3 with small scale : 1 with boss; colour 1 medium : 16 pale.

*Filaments*: 1 purple : 13 white; anthers all purple (when present).

*Stigmata*: 14 purple : 3 white; immature seeds all white.

*Mature capsules*: all of *vulgaris* type.

*Mature seeds*: all armadillo.

N.285=N.120 plant 1 selfed. 22 plants in the family.

*Habit*: for all plants spreading and ascending; stems up to 3.1 dm. with much anthocyanin in vegetative parts; glabrous; mat; 3 semi-strict : 19 not strict.

*Leaves*: as in parent.

*Inflorescence and sex*: with up to 44 flowers; flowers zygomorphic; 6 hermaphrodite : 1 hermaphrodite and female : 11 female.

*Calyx*: all subinflated; all with medium anthocyanin.

*Corolla*: all petals and segments not overlapping or contiguous; anthocyanin blotch absent in all; 1 scale : 10 small scale : 7 boss; colour all white except for one plant with a tinge of pink.

*Filaments*: all purple (where scorable); anthers all purple (where scorable).

*Stigmata*: 17 purple : 1 white (remainder not scorable); immature seeds all white.

*Mature capsules*: all of *vulgaris* type (where scorable).

*Mature seeds*: all armadillo (where scorable).

N.286=N.120 plant 4 selfed. 54 plants in the family.

*Habit*: for all plants spreading and ascending; stems up to 6.3 dm. long; with much anthocyanin in vegetative parts; glabrous; mat; 11 semi-strict : 43 not strict.

*Leaves*: as in parent.

*Inflorescence and sex*: with up to 40 flowers; flowers zygomorphic; 31 hermaphrodite : 2 hermaphrodite and female : 21 female.

*Calyx*: 13 inflated : 41 subinflated; 51 with medium anthocyanin : 3 with little.

*Corolla*: petals all bilobed; all with  $\frac{3}{4}$  lobing; petals and segments all not overlapping or contiguous; anthocyanin blotch absent in all; 14 small scale: 40 boss; colour ~~34~~ pale: 20 white.

*Filaments*: 15 purple: 18 white; anthers all purple (when present).

*Stigmata*: 41 purple: 13 white; immature seeds all white.

*Mature capsules*: all of *vulgaris* type (where scorable).

*Mature seeds*: all armadillo (where scorable).

N.121=B.37 selfed. 28 plants in the family.

*Habit*: rather compact and ascending; stems up to 6.3 dm. long; with medium anthocyanin in vegetative parts; glabrous; mat; 4 semi-strict: 24 not strict.

*Leaves*: as in parent.

*Inflorescence and sex*: with up to 44 flowers; flowers zygomorphic; 14 hermaphrodite: 2 female (remainder unscorable). 12 plants were completely unscorable for flower characters as they either did not produce flowering stems or these failed to flower properly, and others could only be partially scored. Plants were badly attacked by *Marssonina*, and a few also by *Ustilago*, but in addition there were obviously genetical factors concerned in the failure to produce functioning flowering stems (see N.311).

*Calyx*: 1 inflated: 3 subinflated (remainder unscorable); 5 medium: 2 little anthocyanin.

*Corolla*: petals all bilobed, with  $\frac{3}{4}$  lobing; all petals and segments not overlapping or contiguous; anthocyanin blotch absent (where scorable); 1 small scale: 15 boss; colour 4 dark: 7 medium: 1 pale: 4 white.

*Filaments*: all purple (where scorable); anthers all purple (where scorable).

*Stigmata*: all purple (where scorable); immature seeds all white (where scorable).

*Mature capsules*: 6 *vulgaris* type (remainder did not produce fruits).

*Mature seeds*: 4 tubercled (remainder did not produce seeds).

N.311=N.121 plant 6 selfed. 57 plants in the family.

The plants all showed a low strangely compact and stunted growth, without the production of normal flowering stems. 14 plants actually produced each a few flowers in the course of the season, but only a certain number of characters could be scored for these. No seed at all was set except by 4 plants and the infructescences of plants other than these 4 bore only shrivelled calyces surrounding collapsed ovaries. In the 4 plants the capsules were of *vulgaris* type and the seeds were tubercled.

N.122=B.38 selfed. 29 plants in the family.

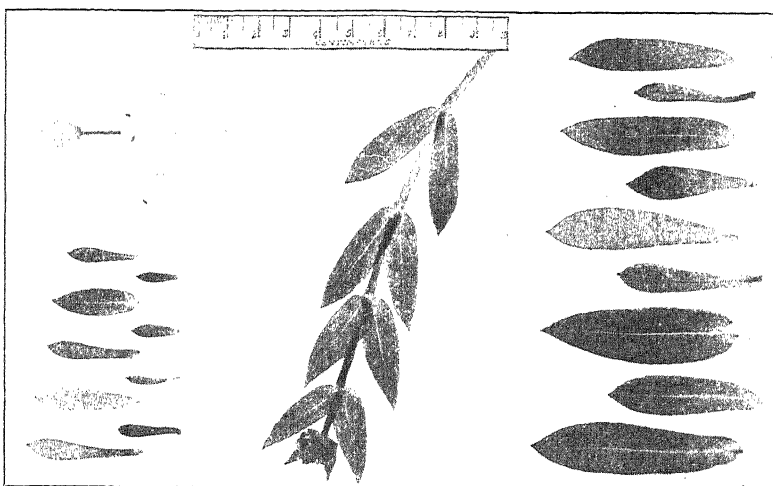
*Habit*: rather compact and ascending; stems up to 4.4 dm. long; with medium anthocyanin in vegetative parts; glabrous; mat; all not strict.

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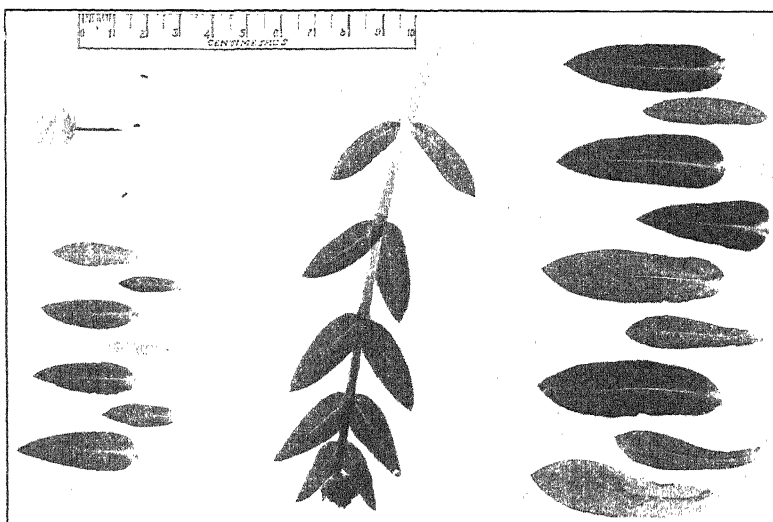
PLATE IV.

Stock Plants. Fig. 1, no. B.37. Fig. 2, no. B.38. Fig. 3, no. B.39.

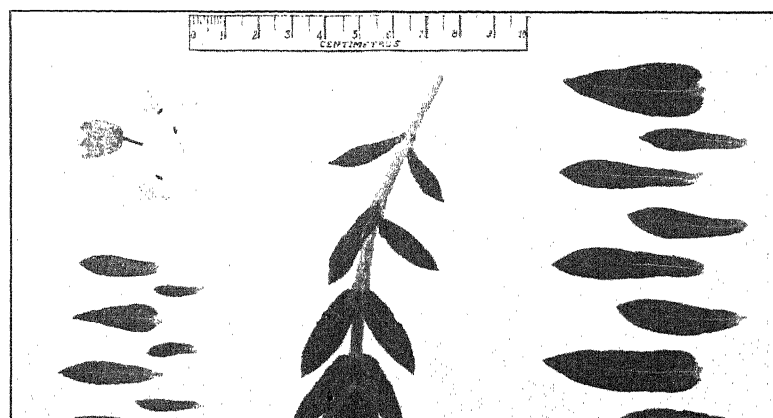
1.



2.



3.







*Leaves* : as in parent.

*Inflorescence and sex* : with up to 28 flowers ; flowers zygomorphic ; 19 hermaphrodite : 3 hermaphrodite and female : 6 female.

*Calyx* : 1 inflated : 7 subinflated : 1 narrow ; 14 with medium anthocyanin : 3 with little.

*Corolla* : petals all bilobed, with  $\frac{3}{4}$  lobing ; all petals and segments not overlapping or contiguous ; anthocyanin blotch absent (where petals scorable) ; 7 small scale : 19 boss ; colour 4 dark : 12 medium : 6 pale : 6 white.

*Filaments* : all purple (where scorable), except in one plant, in which no colour was detectable ; anthers all purple (where scorable).

*Stigmata* : all purple (where scorable), except in one plant with white stigmata ; immature seeds all white.

*Mature capsules* : all of *vulgaris* type (where scorable).

*Mature seeds* : all armadillo (where scorable).

#### DISCUSSION.

The Loch Tay plants and their offspring as dealt with in this paper are classified under *S. vulgaris* since they show the following characters : all died down in the winter to the hemicryptophytic state normal for this species ; relatively large leaf size ; inflorescence many-flowered (up to 48 flowers) ; flowers zygomorphic ; calyx shape of *vulgaris* ; petals and segments nearly all not overlapping or contiguous ; mature capsules of *vulgaris* shape with erect teeth. The experiments were made in the hope of throwing light on the genetics of petal colour. In addition there have appeared effects due to a gene (or genes) reducing or preventing the production of flowering stems. Scorings for certain other characters are also discussed but because of general uniformity of behaviour in the three parents and in all  $F_1$  and  $F_2$  families the following need not be mentioned again in this paper : indumentum (all plants glabrous) ; leaf-shape and size (all plants within the usual range for the species) ; flowers (zygomorphic) ; petal lobing (bilobed,  $\frac{3}{4}$  lobing) ; petals and segments (not contiguous or overlapping, with one exception which may represent merely a phenotypic variation) ; anthers (purple) ; immature seeds (white) ; mature capsules (of ordinary *vulgaris* type and ovoid-ellipsoid in shape).

*Habit* : the compact habit of B.37 and B.38, and the more spreading habit of B.39 appeared also in the  $F_1$  and  $F_2$  offspring ; B.39 had much anthocyanin in the vegetative parts, B.37 and B.38 had medium anthocyanin, and the offspring families all bred true respectively for these characters ; B.37 and B.38 were not strict and the offspring bred true to this character (as far as it was determinable), B.39 was semi-strict and threw a 4 : 17 : 9 ratio for strict : semi-strict : not strict, but the  $F_2$  families from semi-strict parents threw 3 semi-strict : 19 not strict and 11 semi-strict : 43 not strict respectively, while the one family from a not strict plant gave only

not strict offspring. It is probable that this character has a genetic basis but is easily modified by environmental conditions (especially water supply, which in turn is modified by disease).

**Sex** : the three stock plants and the  $F_1$  plants used as parents for  $F_2$  families were all hermaphrodite. All the families segregated for hermaphrodite : female but individual families gave diverse ratios. Summation of all families gave 127 hermaphrodite : 8 hermaphrodite with some female : 53 female. This for hermaphrodite (a few with female flowers as well) : female only gives the ratio 2.55 : 1. Since in the course of our work on this species and the morphologically and genetically closely allied *Silene maritima* we have recorded the sex of many thousands of individuals and have never found a plant which we could describe as "male" (i.e., male-fertile, female-sterile) we have to assume that if an M F scheme is the basis of sex in these species the F gene (or genes) is extremely stable. The corresponding F gene (or genes) in *Ranunculus acris* and other species of this genus are also very stable and a male plant has only once been recorded (by us) from the wild.

**Calyx** : the stock plants had subinflated calyces with medium anthocyanin. There was segregation for shape in four families but owing to the impossibility of scoring many plants for this character it need not be further discussed here. All offspring plants had anthocyanin, and most showed a medium amount but four families showed some plants with little. It is possible that N.120, N.121, and N.122 really show 3 : 1 ratios for medium : little, while N.267, 285 (certainly) and possibly also N.286 are homozygous for medium anthocyanin, the 3 plants with little being phenotypically modified medium plants.

**Corolla** : anthocyanin blotch was present in B.37 but absent in B.38 and B.39. All offspring had no blotch except for one plant derived (as an  $F_2$  plant) from B.39. It must be noted that the scoring for anthocyanin blotch in coloured petals is difficult and sometimes unsatisfactory. We have, however, previously had reason to suspect mutations occurring for this character. B.37 and B.38 had bosses, B.39 had small scales. It is significant that scales appeared only in  $F_2$  offspring from B.39 (from  $F_1$  plants with small scales) and the "small scales" recorded in offspring from B.37 and B.38 may well be enlarged bosses such as occur in many wild populations of *S. vulgaris*.

**Petal colour** : the degrees of colour form a continuous series and the limits of the classes D, M, and P are arbitrary, as is the scoring of "border-line" plants. The figures for colour : white on summation of all five families scored for petal colour, and excepting N.285 which was derived from a white-flowered plant and on selfing gave only white flowers, were 120 coloured to 42 white, which suggests a 3 : 1 ratio. Figures for the individual families suggest that dark, medium, and pale may all be phenotypic modifications of one genotype.

*Filaments* : all stock-plants had purple filaments and families N.120, N.285, N.121, and (probably) N.122 bred true to this character. N.267 gave 1 purple : 13 white and N.286 gave 15 purple : 18 white, both from plants with purple filaments. These figures cannot at present be explained.

*Stigmata* : the three stock plants had purple stigmata as had all plants of N.120, N.121, N. 122, and (with one possible exception) N.285. As with the filaments it is again N.267 and N.286 which threw plants with white stigmata, though with different figures from those recorded for filaments, namely 14 : 3 and 41 : 13 respectively, which may represent 3 : 1 ratios.

*Mature seeds* : B.37 had tubercled, B.38 and B.39 had armadillo seeds and the offspring families bred true to these characters respectively.

*Non-flowering* : families N.121 and N.311 contained a gene or genes which more or less inhibited the production of flowering stems to normal maturity. The gene or genes came from B.37 but as this plant died before it was realized that a genetical basis must be postulated for the abnormal behaviour (which was especially prominent in the  $F_2$  family N.311, affecting in this family all the plants in greater or less degree) it is not possible to repeat the experiments. For the family N.121 the figure 12 for plants not flowering properly is probably too low since every effort was made to score as many flower characters as possible even in those plants in which development of flowering stems and inflorescences was very poor. The plants were highly susceptible to *Marssonina* and some also suffered from *Ustilago* and it was thought at the scoring time of this family that these parasitic fungi might alone be responsible for the abnormal development. This now seems highly improbable, but their occurrence explains why it is not possible to determine the exact genetic behaviour of the stunted growth from our figures.

#### SUMMARY.

An account is given of plants grown from wild seed collected near Loch Tay and of breeding carried out with certain individuals selected as stock plants. Characters which showed segregation were concerned with habit, sex, calyx shape, anthocyanin in calyx, possibly anthocyanin blotch in petals, corona, petal colour, filament colour, stigma colour, and flowering. Coloured petals versus white petals show a very close approximation to a 3 : 1 ratio, and depths of colour may well be due to phenotypic variation of one genotype. The presence of a gene (or genes) more or less preventing the proper development of flowering stems is strongly suggested in two families derived from one stock-plant.

The research on which this paper is based has been aided by a Royal Society Government Grant.

# IX—NOTES ON TWO ASIATIC GENERA OF LAURACEAE. H. K. AIRY-SHAW.

## I. CARYODAPHNOPSIS, GEN. NOV.

Three species currently referred to *Nothaphoebe* have evidently little or no affinity with that genus. These are: *N. tonkinensis* Lecomte, *N. baviensis* Lecomte and *N. pyriformis* (Elm.) Merr. They appear to have been referred to this genus on account of their 4-locellate anthers and minute outer perianth-segments. But in most other characters they differ widely from *Nothaphoebe*, and the following new genus is therefore proposed for their reception.

**Caryodaphnopsis** *Airy-Shaw*, gen. nov. (Lauraceae—? Apollonieae); foliis oppositis triplinerviis, perianthii segmentis exterioribus minutis, interioribus pro rata majusculis valvatis, staminibus fertilibus 9, iis seriei intimae extrorsis, antheris 4-locellatis, staminodiis 3, fructu magno pyriformi pedicello aliquantum incrassato ab omnibus ceteris *Lauraceis* facile distinguendum.

*Perianthii* tubus subnullus; segmenta 6, exteriora minuta, deltoidea, aestivatione aperta, interiora pro rata magna, late triangulari-ovata, aestivatione valvata. *Stamina* 9, vel clavato-oblonga filamento vix distincto, vel anthera quadrata filamento distincto, applanata, 4-locellata, ordinis I et II introrsa, ordinis III extrorsa, haec tantum ut videtur basi glandulifera, glandulis subsessilibus; staminodia 3, breviter sagittiformia, breviter stipitata. *Ovarium* parvum, ovoideum, in stylum brevem attenuatum, stigmate parvo 2-3-lobo. *Fructus* (e descr. cl. Elmer et Liou Ho et specim. imperfectis Elmerianis tantum mihi cognitus) magnus, obovoideus seu pyriformis, drupaceus, durus, nitenti-viridis; pedicello plus minus incrassato, apice expanso; perianthii segmenta caduca. *Semen* (e descr.) magnum, conforme.

*Arbores* mediocres vel parvi. *Ramuli* teretes. *Folia* opposita vel subopposita, triplinervia, tenuiter coriacea, petiolata. *Flores* hermaphroditi, in thyrsos laxos axillares saepe seriales minute bracteatos dispositi.

Species 3, Yunnan, Tonkin, Ins. Philippinarum Borneonisque borealis incolae. Typus: *C. tonkinensis* (Lecomte) Airy-Shaw.

The affinities of this genus are not very clear, but I have no doubt about its distinctness. The name has been taken from the striking resemblance of the leaves to those of certain species of *Cryptocarya* Sect. *Caryodaphne* (= *Pseudocryptocarya* Tschner), e.g. *C. laevigata* Bl. In characters of flower and fruit, however, the genus is much more like *Dehaasia*. But it differs from both these genera in the opposite arrangement of the leaves and in the 4-locellate anthers. The question of what tribe it should be placed in must await a rational revision of the entire *Lauraceae*, for its affinities are evidently rather with the genera with 2-locellate anthers (*Cryptocaryae* and *Apollonieae*) than with other 4-locellate genera (*Cinnamomeae*).

*Clavis Specierum*

Ramuli, petioli, folia subtus tenuissime ferrugineo-tomentella.....

3. *baviensis*

Ramuli, petioli, folia glaberrima :

Inflorescentia floresque dense tomentella ; flores majusculi,  
3.5 mm. diametro ; stamina clavata, filamentum vix distincto.....

1. *tonkinensis*

Inflorescentia floresque minutissime puberula ; flores subduplo  
minores, circiter 2 mm. diametro ; antherae quadratae, filamentum  
distincto .....

2. *Henryi*

1. **Caryodaphnopsis tonkinensis** (Lecomte) Airy-Shaw, comb. nov.

*Nothaphoebe tonkinensis* Lecomte in Nouv. Arch. Mus. [Par.] **5**, 106 (1913) et in Lecomte, Fl. Gén. Indoch. **5**, 118 (1914) ; Liou Ho, Laur. Chine et Indoch. 76 (1934).

*Persea pyriformis* Elm. Leaf. Philipp. Bot. **8**, 2727 (1915) ; Merr. Enum. Philipp. Fl. Pl. **2**, 188 (1923) ; *synon. nov.*

*Nothaphoebe pyriformis* (Elm.) Merr. in Univ. Calif. Publ. Bot. **15**, 77 (1929).

TONKIN. Tu-Phap, dans les bois, Apr. 1887, Balansa 2441 (typus in Herb. Mus. Par., dupl. in Herb. Kew.). Also Poilane 13021, 13036, ex Liou Ho, l.c. (not seen).

ANNAM. Poilane 1406, ex Liou Ho, l.c. (not seen).

PHILIPPINES. Samar & Mindanao : see Merr. Enum. l.c. ; also Bukidnon Prov., Mar.-Apr. 1926, Ablaza in *For. Bur.* 30282. Leyte, Mt. Abucayan, Feb. 1923, Edaño in *Bur. Sci.* 41720. Sulu Prov., Tawi-tawi, July-Aug. 1924, Ramos & Edaño in *Bur. Sci.* 43955.

BRIT. N. BORNEO. Near Tawao, Oct. 1922-Mar. 1923, Elmer 21857.

The Philippine and Bornean material referred to *Persea* or *Nothaphoebe pyriformis* agrees perfectly with the type-collection of *N. tonkinensis*. Balansa calls the plant a shrub, but Elmer and Poilane refer to it as a tree 8-15 m. in height. It is readily distinguished from the other two species by its relatively large, densely tomentellous flowers.

2. **Caryodaphnopsis Henryi** Airy-Shaw, sp. nov.

*Nothaphoebe tonkinensis* f. *brevipedicellata* Liou Ho, l.c. 77.

A *C. tonkinensi* foliis basi rotundatis, floribus subduplo minoribus glaberrimis, a *C. baviensi* ramis petiolis nervis subtus glabris, ab utraque antheris subquadratis filamentum distincto recedit.

Arbor parva, 3-4.5 m. alta. Ramuli graciles, usque 3.5 mm. diametro, teretes, cortice laevi obscure griseo minute et parcissime lenticellato. Folia opposita, ovata, interdum fere elliptico-oblonga, basi optime rotundata, raro levissime subcordata vel subcuneata, apice breviter acuminata, acuta, 9-15 cm. longa, 4.5-6.5 cm. lata, integerrima, chartacea, glabra, siccitate supra obscure brunnea,

subtus glaucescentia; costa supra subplana, subtus prominula; nervi laterales 3-4-jugi, uno jugo subrecto paullo supra basin e costa orto (unde folia triplinervia) et longe ultra medium folium procurren- te, ceteris supra medium ortis valde arcuatis prope marginem anasto- mosantibus; nervi secundarii e lateralibus marginem versus extensi, procurvi; omnes graciles, subtus prominuli; venulae minores tenuissimae, omnes cum costa angulum rectum efformantes et sibi parallelae, venulis ultimis reticulum subtilissimum efformantibus; petioli 10-12 mm. longi, vix 1.5 mm. crassi, supra plani, subtus teretes. *Inflorescentiae* axillares, thyrsoidaeae, 4-7 cm. longae, graciles, ramosae, ramis oppositis 5-8 mm. longis, sub lente minutissime puberulae, statu valde juvenili parcesime ferrugineo- pubescentes, bracteis minutis brunnescentibus. *Flores* per 6-8 in apice ramorum cymose dispositi, pedicellis 2-3 mm. longis. *Perianthii* segmenta exteriora minuta, deltoidea, vix 0.4 mm. longa; segmenta interiora late triangulari-ovata, 2 mm. longa et lata, subacuta, extra minute puberula, intus sparsiuscule ferrugineo- tomentella. *Stamina* ordinis I et II simillima, 1 mm. longa, anthera plana ovato-quadrata apice truncata, filamentis distincto, ordinis III longiora, 1.5 mm. longa, glandulis binis magnis basalibus anthera haud multo minoribus; omnium filamenta (maxime dorso) pubes- centia. *Staminodia* breviter sagittata, 0.8 mm. longa, glabra, stipitata, stipite pubescente. *Ovarium* ovoideum, glabrum, in stylum brevem attenuatum, totum 1 mm. longum, stigmate parvo. *Fructus* ignotus.

YUNNAN. Fêng Chen Lin, S. of Red River, mountain forests, 2100 m., *Henry* 10692 (Herb. Kew.): "Tree 10'-15'."

This was treated merely as a form of *N. tonkinensis* by Liou Ho, but the flowers are so different that it must be considered specifically distinct.

3. *Caryodaphnopsis baviensis* (Lecomte) Airy-Shaw, comb. nov. *Nothaphoebe baviensis* Lecomte in *Nouv. Arch. Mus.* [Par.] l.c. 107, et in Lecomte, *Fl. Gén. Indoch.* l.c.; Liou Ho, l.c. 77.

TONKIN. Ravins à la base du Mont Bavi, 1888, *Balansa* 2445 (typus in Herb. Mus. Par., dupl. in Herb. Kew.): "Arbrisseau à rameaux un peu sarmenteux. Corolle jaunâtre."

Differs from the other species in the close fine dark brown tomentum of the branches, petioles and nerves beneath.

## II. STEMMATODAPHNE IN BORNEO.

The monotypic genus *Stemmatodaphne* Gamble (in Kew Bull. 1910, 227) must be closely related to *Dehaasia* and *Beilschmiedia* (Tribe *Apollonieae*), though Gamble places it next to *Phoebe* (Tribe *Cinnamomeae*). The character of the 2- or 4-locellate anthers seems to have had too much importance attached to it in the classification of the *Lauraceae*; in this instance it certainly separates related genera. I find that Merrill has independently described the species as a *Beilschmiedia* from Borneo.

**S. perakensis** Gamble, l.c., et in Journ. As. Soc. Beng. **75**, 111 (1912); Stapf in Hook. Ic. Pl. **30**, t. 2984 (1913).

*Beilschmiedia longipedicellata* Merr. in Univ. Calif. Publ. Bot. **15**, 83 (1929), non Ridley in Kew Bull. 1926, 475; *synon. nov.*

SARAWAK. Entoyut River, Baram District, Dec. 1894, *Hose* 408.

BRIT. N. BORNEO. Near Tawao, 1922/3, *Elmer* 20782, 20875.

The genus has not previously been recorded as such from Borneo. Merrill reports only six stamens for his *Beilschmiedia longipedicellata*, but in the Kew material of *Elmer* 20875 there were nine perfectly developed stamens in the two flowers which I examined.

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## **X—BERBERIS CHRYSOSPHEA: A NEW SPECIES FROM SOUTHERN TIBET.**

B. O. MULLIGAN (Royal Horticultural Society's Gardens, Wisley).

The continued exploration by Captain Kingdon Ward of the mountainous area at the eastern end of the Himalayan chain, which includes parts of Burma, Assam and Tibet, has already brought to light a number of new species of evergreen *Berberis* of the section *Wallichianae*, notably *B. amabilis* Schneider,\* *B. calliantha* Mulligan, *B. hypokerina* Airy-Shaw, *B. incrassata* Ahrendt, and *B. Wardii* Schneider.\* To these must now be added another, quite distinct from any other in cultivation, but in habit and botanical details most closely resembling *B. candidula* Schneider, a native of Central China which has been known in gardens for many years.

The field note of Capt. Ward's plant is as follows :

" K.W. 11036. *Berberis* sp. nov.?

" A low growing and spreading, almost dwarf, evergreen bush, thickly clothed with highly polished dark green rigid leaves interspersed in winter with scarlet leaves, brilliant white-silver beneath.

" There are the usual thorns, and the leaves also are prickly as in *B. Wallichii*. Flowers solitary, yellow, on long but stiff pedicels in the leaf axils; fruits erect, blue-violet. Apparently very rare. I found one clump on the granite cliffs, approaching the Dri Pass, at about 10,000 ft. altitude. Both flowers and fruits were present on 10th December, but the plant normally blooms in the summer. One of the most beautiful foliage species I have seen, though flowers and fruit add nothing to—and take nothing away from—the plant. Zayul."

Very similar information is given by the same author in " A Plant Hunter in Tibet," 277 (1934), and in the " Gardeners' Chronicle," **98**, 124 (17th August, 1935), although in neither case is the collector's number mentioned. Capt. Ward, however, has confirmed the former reference as relating to this species, as well as the occurrence, so far as his observation went, in one situation only. We may, therefore, consider ourselves lucky that it has been successfully introduced to Britain from the few seeds obtained. I am informed

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\* Published in Fedde, Rep. Spec. Nov. **46**, 257 & 262 (July 1939).



by Prof. Sir W. Wright Smith that it is also growing at the Royal Botanic Garden, Edinburgh, although it has not yet flowered there. The seeds received at Wisley were sown on 24th April, and germinated on 15th May, 1934. Subsequently the plants were potted and later transferred to the shrub nursery, whence in the spring of 1937 they were transferred—nine in number—to the Berberis collection in Seven Acres. By the early autumn of 1939 the largest plants were eighteen inches high and two and a half feet across, measurements which clearly admit it to the limited number of shrubs suitable for the rock garden, and give some indication both of its growth rate and of the limits imposed by the alpine habitat. In the Gardens a position fully exposed to the south was chosen, in light and sandy soil somewhat inclined to drought in summer; the fact that it has thriven under such conditions suggests considerable toleration and gives one encouragement to prophesy that this glossy-leaved dwarf Berberis may well become popular when it is known more widely and has been propagated in quantity. Further, as one might expect from its native habitat, it seems to be perfectly winter-hardy, since it passed through the severe weather of January, 1940, when the ground temperature descended to 0°F., with no more than slight browning of some of the leaves. A detailed description follows.

**Berberis** (sect. **Wallichianae**) **chrysosphaera** *Mulligan*, sp. nov. ; affinis *B. candidulae* C. K. Schn., a qua ramulis juvenilibus plus minus erectis rubellis, foliis hypodermate instructis majoribus obtusioribus plerumque oblanceolatis dentibus numerosioribus, pedicellis longioribus, floribus magnis, et ut videtur ovulis circiter 9–12 differt.

*Fruticulus* densus, surculosus, usque 0·6–0·7 m. altus ut videtur ; *ramuli* minute verrucosi, juventute rubelli. *Folia* coriacea, supra atro-viridia, nitida, subtus alba, cerifera. *Flores* solitarii, circiter 1·7 cm. diam. ; *pedicelli* validi, circiter 2·5 cm. longi. *Fructus* non visi, e collectore caeruleo-violacei.

A small bush at present 45 cm. tall, 75 cm. in width, of suckering habit, the young *branches* more or less upright, tinged red, minutely verrucose, slightly angled, those of the previous year brown, striate, the bark peeling off in strips. *Thorns* trifid, slender, on the young shoots usually 10 mm. but up to 13 mm. long, the central one usually the longest, green with a light brown tip ; on the older wood becoming brown and somewhat harder but not rigid. Internodes 2·2–2·5(–3) cm. long ; *petiole* of the smaller leaves 1·5–3 mm., of the largest 6–9 mm., glabrous, tinged red at the base ; stipules 2, filiform, 1–2 mm. long. *Leaves* of current year's shoots in fascicles of (3–)4–6(–7), on the shorter lateral branches (two years old or more) of 5–8(–9), oblanceolate, elliptic-lanceolate, or the smaller elliptic, (1·7–)2·5–4 cm. long including the petiole, 0·5–1·1 cm. wide, coriaceous, apex obtuse to acute, mucronate, base cuneate and decurrent along the petiole, margin recurved, frequently undulate with from a few up to fourteen teeth 0·75–2 mm. long on

each side, either spreading or pointing forward, upper side dark green and shining, the midrib impressed and some of the secondary veins visible, underside waxy white with a thick covering of papillae, the wax disappearing with age, midrib conspicuously raised but lateral veins only rarely visible. Hypoderm present beneath the epidermis, moderately thick-walled.

*Flowers* produced at the end of April or early in May at least a week before *B. candidula* Schn. or *B. calliantha* Mulligan, singly from the fascicles of leaves on one or two year old wood ; bud scales triangular-lanceolate, glabrous, 5–6 mm. long, the outer tinged red ; *pedicels* about 2.5 cm. long, green or red-tinged on the upper side, glabrous, stout, decurved in the upper half and thickened below the flower ; flower 1.7–1.8 cm. diam., the six sepals spreading almost horizontally to expose the flattened-spherical petals ; *outer sepals* 3, ovate to elliptic-ovate, slightly concave, 6–7.5 by 5–6 mm., subacute, greenish outside yellow within ; *inner sepals* 3, obovate, slightly concave, 10 by 7.5 mm., obtuse, yellow with a greenish main vein ; *outer petals* 3, obovate to nearly obcordate, concave, about 8 by 6 mm., butter yellow, emarginate, with a pair of basal nectaries at the point of adhesion with the filament ; *inner petals* 3, obovate-oblong, concave, 7 by 5 mm., slightly emarginate and undulate, of similar colour and having nectaries like the outer petals ; *stamens* 5 mm. long, filament 3 mm., flattened, apex truncate, the slightly swollen portion immediately below the anther markedly papillose ; *ovary* 4 mm. long including the capitate stigma ; ovules frosted in material available at Wisley (1st May, 1939) but apparently numbering about 9–12. Fruit not seen.

S.E. TIBET. Zayul, near the Dri-La Pass, Rongtö Valley, *Kingdon Ward* 11036 (in Herb. Brit. Mus.) ; in flower.

The name *chrysosphaera* is derived from the Greek words χρυσός and σφαῖρα and has reference to the colour and shape of the open flower.

The habit of the plant is quite different from that of *B. candidula* which tends to form a low compact mound and does not make the longish upright shoots of *B. chrysosphaera*, nor are they tinged red as in the latter. In the foliage distinctions may be seen in the larger size, the presence of a hypoderm, the predominatingly oblanceolate as opposed to the sharply elliptic leaves of *B. candidula*, with the greater number of spreading teeth, whilst the earlier and larger flowers on longer pedicels, besides the probably greater number of ovules, all serve to mark this off as a new and distinct species of the section *Wallichianae*.

Acknowledgments are here gratefully made to Dr. T. A. Sprague, of the Herbarium, Royal Botanic Gardens, Kew, for reading through and making suggestions for improving the Latin diagnosis and description and to Dr. G. Taylor of the British Museum (Natural History) for seeking out the type and providing me with the necessary information.

## XI—MISCELLANEOUS NOTES.

**The Lily Year-Book.\***—The Lily Year-Book published by the Royal Horticultural Society contains many papers of interest to botanists as well as horticulturists. There are four main papers of scientific importance: (1) a carefully compiled and complete list of hybrid lilies, by A. Simmonds, with references, details as to parents and other notes; (2) observations concerning the root-system of lilies, by M. A. H. Tincker, based on research carried out at the Wisley Laboratory; (3) an interesting and original survey of European lilies of the *Isolirion* Section, by F. Stoker, and (4) an account of *Lilium pardalinum* and its varieties and allies, by A. Vollmer. There are several other notes of botanical interest and four papers dealing with the genus *Fritillaria*. On the horticultural side there are important articles on the cultivation of lilies in Canada, United States and the British Isles, and a number of miscellaneous notes on subjects of interest.

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**Municipal Parks.†**—It is fitting that this book, which is the first dealing with municipal parks, should have been compiled by Mr. W. W. Pettigrew who has an unrivalled knowledge of the subject. During his forty years and more of municipal work at Manchester he has had to face the whole range of problems of administration connected with the running of a Parks Department.

The subject is dealt with very exhaustively and Mr. Pettigrew has put his information before his readers in a clear and concise form that can be readily assimilated. The method of treating individually subjects such as tennis courts, bowling greens, office staffs, etc., is a particularly wise one, as all that can be said about each subject is easily accessible without cross-references. Many prices given are subject to locality, but the method of comparing estimates is very sound, and one that can well be adopted by other officers in this class of municipal work.

The book makes interesting reading and is one that will benefit not only the Park Superintendent, but also young members of the profession; it would be of great assistance if it were available to members of Parks Committees as well. The illustrations given are perhaps rather few in number, but in quality are quite in keeping with the standard of the book.

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\* "Lily Year Book, No. 8, 1939." Royal Horticultural Society, London, 1939. Pp. 183, 30 figs. Price 5s. paper, 6s. cloth.

† "Municipal Parks, Layout, Management and Administration," by W. W. Pettigrew, V.M.H. London: The Journal of Park Administration, Ltd., Bank Chambers, 329, High Holborn, W.C.1. 1937. Pp. 279, 56 plates, plans, and forms. Price 21s. post free.

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# BULLETIN OF MISCELLANEOUS INFORMATION No. 3 1940 ROYAL BOTANIC GARDENS, KEW

## XII — ADDITIONAL NOMINA GENERICA CONSERVANDA (PTERIDOPHYTA AND PHANEROGAMAE).

The generic names contained in the following list have been conserved by the Special Committee for Phanerogamae and Pteridophyta appointed by the 6th International Botanical Congress, Amsterdam (1935), and have been communicated to the undersigned (as Secretary of the Executive Committee of Nomenclature) by the Secretary of the Special Committee (M. L. Green). The list would normally have appeared in a Supplement to the International Rules of Botanical Nomenclature, ed. 3. As the publication of such a Supplement seems to be impracticable under present international conditions, it has seemed best to publish the list of Nomina Conservanda separately for the information of all concerned.

The names referred to the Committee included those in the lists printed in the International Rules, ed. 3 (1935), pp. 131–138, in Sprague, Synopsis of Proposals (1935), pp. 68–73, and in Sprague, Preliminary Opinions (1935), p. 25, as well as over 300 later generic homonyms listed and discussed in Kew Bulletin, 1935, pp. 342–544. The list contained in International Rules, ed. 3, had been considered previously by a small Special Committee for Phanerogamae and Pteridophyta appointed by the International Botanical Congress, Cambridge (1930). Exception having been taken at Amsterdam, however, to certain decisions of that Committee, as recorded in the list, the latter was re-submitted to the much larger new Committee for Phanerogamae and Pteridophyta appointed at Amsterdam. In all cases, however, where no specific objection had been raised—either at the Amsterdam Congress or afterwards, by members of the new Committee—the decisions of the previous Committee were confirmed by a general vote.

As the result of the new voting on disputed cases, five additional names were conserved, namely, 381\* *Scolochloa*, 1502 *Zeuxine*, 2821 *Lindera*, 4623 *Denhamia*, 8909 *Celmisia*; and the decision concerning *Statice* L. was varied, 6350 *Armeria* and 6351 *Limonium* being conserved against *Statice* L. em. Mill. and *Statice* L. em. Willd. respectively. The corrected spelling, 469 *Heleocharis*, was rejected by the new Committee in favour of the original spelling *Eleocharis*, which accordingly stands without conservation.

\* The numbers prefixed to generic names are those of Dalla Torre et Harms, *Genera Siphonogamarum* (1900–07).

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In view of the decision of the Amsterdam Congress, that nomina provisoria are not validly published, it now appears to be unnecessary to conserve 384 *Puccinellia* Parl. against *Atropis* Rupr. It is unnecessary to conserve 6130 *Laser* Borkh., because the two prior names for the genus, *Bradlaeia* Neck. and *Siler* Ludw., are later homonyms, the former of *Bradlea* Adans. (vide Kew Bull. 1928, p. 348; Internat. Rules, ed. 3, Art. 70, Examples of orthographic variants), and the latter of *Siler* Mill. For reasons already given in International Rules ed. 3, pp. 131–137, it is unnecessary to conserve 134 partim *Anadelphia* Hack., 1504 *Goodyera* R. Br., 3557 *Hoffmanseggia* Cav., 5957 *Oreomyrrhis* Endl., and 7569 *Microdon* Choisy.

One of the generic names proposed for conservation in "Synopsis of Proposals," pp. 68–73, 512 *Eriospora* Hochst. (Cyperaceae), was withdrawn owing to the existence of the earlier homonym *Eriospora* Berk. et Br. (Sphaeropsidae), which is kept up by mycologists (vide Proc. Bot. Congr. Amsterdam, 1935, I. p. 359). The Committee was in favour of retaining 7692 *Haussmannia*, but did not place it on the list, as its conservation against *Hausmania* Dunker, the name of a genus of fossil plants, appeared to be unnecessary. The former commemorates Baron George Eugène Haussmann (1809–1891), whose name is associated with the rebuilding of Paris, whereas the latter was dedicated to J. F. L. Hausmann (1782–1859). 8474 *Emeorhiza* Pohl (1825), nomen (Prelim. Opin. p. 25) was not conserved, since the conservation of 2811 partim *Endlicheria* Nees precludes the adoption of 8474 *Endlichera* Presl. Hence the name *Emeorhiza* Pohl ex Endl. stands without conservation for the Rubiaceae genus concerned. Endlicher's spelling *Enmeorhiza* may be treated as a typographic error or as an unintentional orthographic error, since he erroneously attributed that spelling to Pohl. The name evidently refers to the emetic properties of the root, as stated by Wittstein (Etym.-bot. Handwörterb. ed. 2, p. 320: 1856), and there was no etymological justification for the insertion of an additional "m." Hence the name may be kept up as *Emeorhiza* Pohl ex Endl. ("*Enmeorhiza*").

The Committee was in favour of the retention of 2813 (Lauraceae) *Cryptocarya* R. Br. (Prelim. Opin. p. 25), but it was pointed out that it was advisable, in any case, to conserve 2759 (Monimiaceae) *Peumus* Mol., with *P. Boldus* Mol. as lectotype, for the genus of Monimiaceae for which the name *Peumus* had been adopted in Bentham and Hooker's Genera Plantarum, Engler and Prantl's Die Natürlichen Pflanzenfamilien, and Perkins' monograph of Monimiaceae in Engler's Pflanzenreich. The Committee accordingly recommend the conservation of 2759 *Peumus* Mol., and if this recommendation is confirmed by the next International Botanical Congress, it will be unnecessary to conserve *Cryptocarya* Br. against *Peumus* Mol. pro parte majore. Such confirmation appears to be necessary, as 2759 *Peumus* Mol. was not one of the names previously recommended.

for conservation and referred, with power of decision, to the Committee.

Some of the names in the list which follows are marked with the symbol † in order to indicate that their conservation is apparently unnecessary. These cases will be considered by the Editorial Committee in due course, and it may be thought desirable to refer some of them to the Executive Committee for decision, under Art. 73 (1), if substantial doubt is found to exist as to the interpretation of the relevant rules.

One of the questions that seems to have offered most difficulty is that of deciding whether a particular generic name which is almost the same as another should be treated as an orthographic variant of it or as a different name under Art. 70. Note 3 of that Article is as follows: "In deciding whether two or more slightly different names should be treated as distinct or as orthographic variants, the essential consideration is whether they may be confused with one another or not: if there is serious risk of confusion, they should be treated as orthographic variants. Doubtful cases should be referred to the Executive Committee."

No doubt arises when two generic names *begin* with a different letter, except where the difference lies in the presence or absence of an initial H (e.g., *Heleocharis* and *Eleocharis*): *Durvillea* and *Urvillea* are given as examples of different names.

Differences in the middle of the name offer more difficulty: *Gerrardina* (commemorating W. T. Gerrard) and *Gerardiina* (like a *Gerardia*, that genus in its turn being dedicated to John Gerard), differing in two letters and with different derivations are treated as different names; so also are *Symphyostemon* (Iridaceae) and *Symphostemon* (Labiateae) which differ only in the presence or absence of the letter "y," the derivation being the same. On the other hand there is obviously grave risk of confusion between *Asterostemma* Decne. and *Astrostemma* Benth., belonging to the same family, Asclepiadaceae: the first parts of the generic names, "astero" and "astro" being orthographic variants employed in Greek for compounds of aster (ἀστήρ, a star). These are accordingly treated as orthographic variants, and the same applies to *Pleuri-petalum* and *Pleuropetalum* since they differ only in the connecting-vowel, "i" or "o."

As regards the last syllable or last two syllables, generic names ending respectively in the masculine, feminine and neuter terminations -us, -a, -um, are held to be different: thus *Peponium* Engl. (Cucurbitaceae) is treated as a different name from *Peponia* Grev. (Bacillariaceae). No confusion can arise between *Peponium* Engl. and *Peponia* Naud. because they are nomenclatural (i.e. absolute) synonyms. Similarly *Peltophorus* (Gramineae) and *Peltophorum* (Leguminosae) are treated as different names.

On the other hand, where two names commemorate the same person, a difference of termination in -a or -ia does not warrant their

being treated as different names: *Columella* and *Columellia* both commemorating Columella, the Roman writer on agriculture, are orthographic variants; so also are *Eschweilera* and *Eschweileria*, though it does not appear to be known whether they commemorated the same Eschweiler or not. The four names *Bradlea* Adans., *Bradlaeia* Neck., *Bradleja* Banks ex Gaertn. and *Braddleya* Vell. all commemorating Richard Bradley (1675–1732), are treated as orthographic variants, because each of them has been spelt by subsequent authors both as "*Bradleia*" and as "*Bradleya*," and only one can be used without serious risk of confusion.

On the basis of the foregoing analysis of the provisions and examples given under Art. 70 regarding orthographic variants and different names, and of the Amsterdam decision regarding nomina provisoria, it has been possible to frame preliminary opinions on whether it is necessary or not to conserve the various names marked in the list with the symbol †. Reasons for these opinions are put forward for consideration by those concerned.

#### I. NAMES NOT REQUIRING CONSERVATION OWING TO THEIR EARLIER HOMONYMS BEING NOMINA PROVISORIA.

- 417 Gramineae *Phyllostachys* Sieb. et Zucc.  
7878 Gesneriaceae *Seemannia* Regel

#### II. NAME PERHAPS REQUIRING CONSERVATION OWING TO POSSIBLE DOUBT AS TO THE PRIOR SYNONYM BEING A NOMEN PROVISORIUM.

- 384 Gramineae *Puccinellia* Parl.

The prior synonym *Atropis* Rupr. (1845) is considered by the writer to be a nomen provisorium, on the ground that Ruprecht treated it as a section of *Poa* in the text of his "Flores Samoedorum Cisuralensium," p. 61, n. 313 (Beitr. Pflanzenk. Russ. Reich. II: 1845). Different interpretations, however, have been given of his remark on p. 64: "E conditione glumarum generum series fortasse sequens: *Dupontia*, *Arctophila*, *Poa*, *Atropis*, *Catabrosa*, *Phippsia*, *Coleanthus*." It might be translated: "On the basis of the nature of the glumes, the following series of genera might perhaps be distinguished." Others have considered that the word "fortasse" qualified "sequens," and that the list of generic names was put forward as an alternative classification. The fact that Ruprecht published five new binary combinations under *Arctophila* and two under *Dupontia* on plates IV–VI of his work lends a certain amount of colour to the latter view. Hence it might be best to retain *Puccinellia* on the list of nomina conservanda, in order to avoid any possible doubt as to the correct name of the genus under International Rules.

#### III. NAMES APPARENTLY NOT REQUIRING CONSERVATION OWING TO SLIGHTLY DIFFERENT EARLIER NAMES BEING DIFFERENT NAMES.

- 3022 *Lepidostemon* Hook. f. et Thoms. (1861) and *Lepistemon* Blume (1825)—vide Kew Bull. 1935, 424.

1. The two names differ by the *internal addition* of two letters—cf. *Symphystemon* and *Symphostemon*, *Gerrardina* and *Gerardiina*, given as examples of different names under Art. 70.

2. Though *Lepistemon* was “corrected” to *Lepidostemon* by Hasskarl (1844), it has been consistently spelt *Lepistemon* in standard taxonomic works of reference such as Benth. et Hook. f., Gen. Pl., Engl. u. Prantl, Nat. Pflanzenfam., and the various floras concerned. No confusion between the two names has arisen.

3967 *Augea* Thunb. (1794) and *Augia* Lour. (1790)—vide Kew Bull. 1935, 363.

These are here treated as different names for the following reasons:

1. *Augea* commemorates Andreas Auge, whereas *Augia* is derived from the Greek word αὐγή.

2. The two generic names seem always to have been spelt differently.

3. *Augea* belongs to the Zygophyllaceae, whereas *Augia*, according to Merrill (Trans. Amer. Phil. Soc. n.s. XXIV, pt. 2, 244: 1935) was based on a mixture of *Rhus succedanea* L. (Anacardiaceae) and a flower belonging to some other family, possibly of a *Calophyllum* (Guttiferae).

4. No confusion between the two names is likely to arise, since *Augia* Lour. is relegated to synonymy.

5036 *Cumingia* Vidal (1885) and *Cummingia* D. Don (1828)—vide Kew Bull. 1935, 419.

1. *Cumingia* commemorates Hugh Cuming (1791-1865), whereas *Cummingia* commemorates Lady Gordon Cumming.

2. *Cumingia* belongs to the Bombacaceae, *Cummingia* to the Amaryllidaceae.

3. No confusion appears to have occurred between the two generic names, although *Cummingia* was mis-spelt *Cumingia* by Kunth (1843) and Baker (1879).

5311 *Byrsanthus* Guill. (1837) and *Byrsanthes* C. Presl (1836)—vide Kew Bull. 1935, 395.

1. Their final elements are etymologically distinct, that of *Byrsanthus* being the latinized form of the substantive anthos, a flower, whereas that of *Byrsanthes* is the adjectival suffix -anthes, -flowering, provided with a flower.

2. The two generic names seem always to have been spelt differently. Schönland (Engl. u. Prantl, Nat. Pflanzenf. IV. Abt. 5, 66: 1894), who treated *Byrsanthes* C. Presl as a section of *Siphocampylus* Pohl, cited the sectional name as “Sect. III. *Byrsanthus* Presl (als Gatt.),” but this seems to have been due to a lapsus calami or printer’s error.

3. The two genera belong to different families, *Byrsanthus* to Flacourtiaceae, *Byrsanthes* to Campanulaceae (-Lobelioideae).

It seems clear that no confusion either has arisen or is likely to arise between the two generic names.



(Boraginac.) *Vaupelia* Brand (1914) and *Vaupellia* Griseb. (1861)—vide Kew Bull. 1935, 528.

1. The spelling of the two names differs internally.

2. *Vaupelia* is dedicated to F. Vaupel, whereas *Vaupellia* commemorates C. T. Vaupell (1821-1862)—vide Christensen, Den Danske Botaniks Historie, II. 289 (1925).

3. *Vaupelia* belongs to the Boraginaceae, *Vaupellia* to the Gesneriaceae.

9150 *Podanthus* Lag. (1816) and *Podanthes* Haw. (1812)—vide Kew Bull. 1935, 451.

1. The final elements *-anthus* and *-anthes* are etymologically distinct—see the case of 5311 *Byrsanthus* and *Byrsanthes*.

2. The two names have been used for many years without any confusion arising. Both are kept up in Bentham and Hooker's Genera Plantarum, vol. II.

3. The two genera belong to different families, *Podanthus* to Compositae, *Podanthes* to Asclepiadaceae.

#### IV. NAMES APPARENTLY REQUIRING CONSERVATION OWING TO SLIGHTLY DIFFERENT EARLIER NAMES BEING ORTHOGRAPHIC VARIANTS.

1386 *Arachnitis* Phil. (1864) and *Arachnites* F. W. Schmidt (1793)—vide Kew Bull. 1935, 361.

1. Both names refer to the spider-like appearance of the flower.

2. *Arachnitis* Phil. was spelt *Arachnites* by Philippi himself in a later paper (1865), and the spelling *Arachnites* was adopted in Benth. et Hook. f., Gen. Pl. (1883), Engl. u. Prantl, Nat. Pflanzenf. (1889), Dalla Torre et Harms, Gen. Siphonog. (1900) and Skottsberg (1916).

3. The two genera belong to closely related families, Corsiaceae and Orchidaceae.

These considerations suggest that the two names should be treated as orthographic variants.

(Orchidac.) *Symphyglossum* Schlechter (1919) and *Symphyoglossum* Turcz. (1848)—vide Kew Bull. 1935, 506.

The two names differ only in presence or absence of the connecting vowel "o," and should accordingly be treated as orthographic variants, since *Pleuripetalum* and *Pleuropetalum*, which have different connecting vowels, are treated as such under Art. 70.

3931 *Wendtia* Meyen (1834) and *Wendia* Hoffm. (1814)—vide Kew Bull. 1935, 538.

1. *Wendtia* Meyen was dedicated to Captain W. Wendt, who was in command of the Prinzess Louise during Meyen's travels round the world (1830-32). *Wendia* Hoffm. commemorated Dr. Wendt, Professor of Medicine at Erlangen and successor of Schreber (Friedr. von Wendt, fide Wittstein, Etym.-bot. Handwörterb., ed. 2, 932: 1856).

2. The spelling of *Wendia* Hoffm. was "corrected" to *Wendtia* by De Candolle in 1830, and this "corrected" spelling has been adopted by numerous authors, including Woronow (1917), who published new combinations under it.

3. Although *Wendtia* Meyen belongs to the Geraniaceae, and *Wendia* Hoffm. to the Umbelliferae, there is evidently risk of confusion between the two names.

9365 *Peyrousea* DC. (1837) and *Peyrousia* Poir. (1826)—vide Kew Bull. 1935, 447.

1. *Peyrousea* DC. was a new name for *Lapeirousia* Thunb. (1800), and *Peyrousia* Poir. was a new name for *Lapeirousia* Pourr. (1788).

2. *Peyrousea* DC. was dedicated to the traveller "T. Fr. Galaup de La Pérouse" [i.e., J. Fr. Galaup de La Pérouse], whereas *Peyrousia* Poir. commemorated the botanist P. P. de La Pérouse.

3. The personal generic names *Eschweilera* and *Eschweilera*, treated as orthographic variants under Art. 70, differ in the terminations being *-a* and *-ia* respectively. There seems to be hardly any more difference between the terminations *-ea* and *-ia*, where personal generic names are concerned.

4. Confusion can easily arise between *Peyrousea* and *Peyrousia* since they were substitutes for two generic names each spelt *Lapeirousia*.

#### V. NAMES APPARENTLY NOT REQUIRING CONSERVATION BECAUSE THEIR PRIOR SYNONYMS ARE ORTHOGRAPHIC VARIANTS (I.E. LATER HOMONYMS) OF EARLIER NAMES.

1502 *Zeuxine* Lindl. (1826).

The prior synonym *Adenostylis* Blume (1825) should be treated as an orthographic variant (i.e. as a later homonym) of *Adenostyles* Cass. (1816).

1. The etymology of the two names is different, *Adenostylis* being a compound of the substantive *stylis* a diminutive of *stylos*, and *Adenostyles* a compound of the adjective *-styles*.

2. *Adenostylis* Blume has, however, been spelt "*Adenostyles*" by Endlicher (1841), and by Bentham and Hooker (1883), who cited it in synonymy; and *Adenostyles* Cass. was "corrected" to "*Adenostylis*" by Post et Kuntze, Lexic. Gen. Phan. 10 (1903).

3. Hence both generic names could hardly be accepted without serious risk of confusion.

3050 *Dontostemon* Andr. ex Ledeb. (1831)—vide Kew Bull. 1935, 356 (sub *Andrzejowskia*).

The prior synonym, *Andreoskia* DC. (1824) should be treated as an orthographic variant of *Andrzejowskia* Reichb. (1823) for the following reasons.

1. Both commemorate A. L. Andrzejowski (1784–1868).

2. *Andrzejowskia* has been spelt *Andreoskia* by Spach, Boissier, Prantl and Dalla Torre et Harms.

3. Both genera belong to the Cruciferae.

4. Confusion between the two generic names has actually occurred, namely, in Durand et Jackson, *Index Kewensis, Supplementum Primum*, 26 (1902), where the combination *Andreoskia cardaminefolia* "Prantl" [i.e. (DC.) Boiss.] is erroneously placed under *Andreoskia* DC.

It may be well to emphasize three points : (1) that the conclusions reached in the foregoing analysis represent merely the personal views of the writer, put forward for the consideration of the Editorial Committee and, if thought necessary or desirable, of the Executive Committee of Nomenclature ; (2) that the list should be examined by the other Special Committees, in order to ascertain whether any of the names in it are homonyms of names accepted in other groups of recent plants, or for fossil plants, this being the procedure indicated in *Proc. Internat. Bot. Congr. Amsterdam, 1935*, I. 359, 361 ; any such cases discovered would be re-considered in the light of the new facts ; (3) that the absence of a name in the space for *Nomina Rejicienda* does not necessarily mean that there are no synonyms for the generic name concerned.

T. A. SPRAGUE.

*Special Committee for Phanerogamae and Pteridophyta appointed by the Sixth International Botanical Congress, Amsterdam, 1935.*

*Secretary* : M. L. Green (Kew).

A. H. G. Alston (London) ; A. Becherer\* (Genève) ; R. C. Ching (Nanking) ; C. Christensen (Copenhagen) ; J. E. Dandy (London) ; J. Th. Henrard (Leiden) ; A. S. Hitchcock† (Washington) ; B. P. G. Hochreutiner (Genève) ; J. Lanjouw (Utrecht) ; R. Mansfeld (Berlin) ; F. Pellegrin (Paris) ; A. Rehder (Jamaica Plain, Mass.) ; Hans Schinz (Zürich) ; C. Skottsberg (Göteborg) ; H. Uttien (Utrecht) ; C. A. Weatherby (Cambridge, Mass.) ; F. J. Widder (Graz) ; A. J. Wilmott\* (London) ; and the following, ex officio : H. Harms (President, Executive Committee), T. A. Sprague (Secretary, Executive Committee).

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\* Resigned.

† Deceased.

## NOMINA CONSERVANDA

### POLYPODIACEAE

- Ceterach** Garsault, Fig. Pl. II. (1764) t.212; Lam. et DC. Fl. Franç. ed. 3, II. (1805) 566.—T.: *C. officinarum* Lam. et DC.  
**Cystopteris** Bernh. in Schrad. Journ. I. (1806) pars 2, 5, 26.—T.: *C. fragilis* (L.) Bernh.  
**Dryopteris** Adans. Fam. Pl. II. (1763) 20.—T.: *D. Filix-mas* (L.) Schott.

- Pteridium** Scop. Fl. Carniol. ed. 1 (1760), 169, partim, nomen abortivum; Kuhn, Bot. Ost-Afr. Deck. Reise, III. pars 3 (1879), 11.—T.: *P. aquilinum* (L.) Kuhn.

### TAXACEAE

17. **Torreya** Arn. in Ann. Nat. Hist. I. (1838) 130; non Rafin. in Amer. Monthly Mag. (1818) 356; nec Rafin. in Journ. de Phys. LXXXIX. (1819) 105; nec Spreng. Neue Entdeck. II. (1821) 121; nec Eaton, Man. Bot. N. Amer. ed. 7 (1836), 560; nec Croom ex Meissn. Gen. II. (1843) 340.—T.: *T. taxifolia* Arn.

### POTAMOGETONACEAE

57. **Posidonia** König in König et Sims, Ann. Bot. II. (1805) 95, t.6.—T.: *P. Caulini* König.

## NOMINA REJICIENDA

- Ceterac** Adans. Fam. Pl. II. (1763) 20, partim.  
*Filix* Adans. Fam. Pl. II. (1763) 20, 558; nec *Filix* Hill (1755).  
*Filix* Hill, Family Herbal (1755), 171; non Ludw. (1757); nec Adans. (1763).  
*Filix mas* Hill, Brit. Herbal (1756), 527 et Index.  
*Thelypteris* Schmidel, Ic. Pl., ed. J. C. Keller (1762), 45, tt. 11, 13; non Adans. (1763).  
*Eupteris* Newman in Phytologist, II. (1845) 278.  
*Cincunnalis* Gleditsch, Syst. Pl. (1764) 296.

- Tumion* Rafin. Amen. Nat. (1840) 63; Greene, Pittouia, II. pars 10 (1891), 193.

- Alga* Boehm. in Ludw. Defin. Gen. Pl. ed. Boehm. (1780) 503.

## NOMINA CONSERVANDA

## GRAMINEAE

124. **Vossia** Wall. et Griff. in Journ. Asiat. Soc. Bengal, V. (1836) 572; non Adams. Faun. Pl. II. (1763) 243; nec Thümen in Oesterr. Bot. Zeitschr. XXIX. (1879) 18.—T.: *V. cuspidata* (Roxb.) Griff.

134, partim. **Diectomis** Kunth in Mém. Mus. Hist. Nat. Paris, II. (1815) 69; H.B.K. Nov. Gen. I. (1816) 193; non Beauv. (1812).—T.: *D. fastigiata* (Swartz) H.B.K.

134, partim. **Chrysopogon** Trin. Fund. Agrost. (1820) 187.—T.: *C. Gryllus* (L.) Trin.

171. **Setaria** Beauv. Agrost. (1812) 51, 178, explic. planches, 9, t. 13, fig. 3; Fl. Owar. II. (1818) 80, t. 110, fig. 2; non Ach. (1798), Michx. (1803).—T.: *S. viridis* (L.) Beauv.

257. **Holcus** L. Sp. Pl. ed. 1 (1753), 1047, partim; Gen. Pl. ed. 5 (1754), 469, partim; emend. Swartz in Schrad. Neues Journ. Bot. 1808, II. pars 2, 39.—T.: *H. lanatus* L.

312. **Schmidtia** Steud. in J. A. Schmidt, Beitr. Fl. Cap Verd. Ins. (1852) 144; non Moench, Meth. Suppl. (1802) 217; nec Tratt. Fl. Oesterr. Kaiserth. I. (1816) 12, t. 10, nomen rejic.—T.: *S. pappophoroides* Steud.

329. **Cortaderia** Stapf in Gard. Chron., Ser. 3, XXII. (1897) 378, 396.—T.: *C. argentea* (Nees) Stapf.

## NOMINA REJICIENDA

*Rhaphis* Lour. Fl. Cochinch. (1790) 552.

[*Pollinia* Spreng. Pugill. II. (1813) 10, partim; non Trin. (1833).]

*Centrophorum* Trin. Fund. Agrost. (1820) 106.

*Chaetochloa* Scribn. in U.S. Dep. Agric. Div. Agrost., Bull. IV. (1897) 38.

*Ginannia* Bub. Fl. Pyren. IV. (1901) 321; non Scop. (1777).

*Notholcus* Nash ex Hitchcock in Jepson, Fl. Calif. I. (1912) 126.

*Nothololcus* Nash in Britt. et Brown, Ill. Fl. ed. 2, I. (1913) 214.

*Antoschmidtia* Steud. Syn. Pl. Gram. (1855) 199, in syn.; Boiss. Fl. Or. V. (1884) 559.

*Moorea* Lemaire in Ill. Hort. II. (1854) Misc. 15, in obs.

381. **Scolochloa** Link, Hort. Berol. I. (1827) 136; non Mert. et Koch, Deutsch. Fl. I. (1823) 374, 528.—T.: *S. festuacea* (Willd.) Link.

384. †**Puccinellia** Parl. Fl. Ital. I. (1848) 366.—T.: *P. distans* (L.) Parl.

417. †**Phyllostachys** Sieb. et Zucc. in Abh. Akad. München, III. (1843) 745, t. 5; non Torr. in Ann. Lyc. New York, III. (1836) 404, in obs., nomen provisorium.—T.: *P. bambusifolia* Sieb. et Zucc.

#### CYPERACEAE

459, partim. **Mariscus** Gaertn. Fruct. I. (1788) 11; Vahl, Enum. II. (1806) 372; non Zinn, Cat. Pl. Hort. Gott. (1757) 79.—T.: *M. capillaris* Vahl.

462. **Kyllinga** Rottb. Descr. et Icon. Pl. (1773) 12; non Källinga Adans. Fam. Pl. II. (1763) 498, 539.—T.: *K. monocephala* Rottb.

468, partim. **Blysmus** Panz. ex Schultes, Mant. II. (1824), 41.—T.: *B. compressus* (L.) Panz.

471, partim. **Bulbostylis** Kunth, Enum. Pl. II. (1837) 205; non Stev. in Mém. Soc. Nat. Mosc. V. (1813) 355; nec DC. Prodr. V. (1836) 138.—T.: *B. capillaris* (L.) C. B. Clarke.

492. **Rhynchospora** Vahl [corr. Willd. Enum. Pl. Hort. Berol. (1809) 71] Enum. II. (1806), fol. 2, verso n. 113 et 229.—T.: *R. alba* (L.) Vahl.

#### PALMAE

543. **Washingtonia** H. Wendl. in Bot. Zeit. XXXVII. (1879) p. lxi. 68, 148; non Rafin. in Amer. Monthly Mag. II. (1818) 176; nec Winslow in Calif. Pharm. (Sept. 1854) ex Hook. Kew Journ. Bot. VII. (1855) 29.—T.: *W. filifera* H. Wendl.

567. **Pigafetta** Becc. Malesia, I. (1877) 89; non Adans. Fam. Pl. II. (1763) 223.—T.: *P. papuana* Becc. = *P. filaris* (Bl.) Becc.

*Fluminia* Fries, Summ. Veg. Scand. I. (1846) 247.

*Atropis* Rupr. in Beitr. Pflanzenk. Russ. Reich. II. (1845) 61, nomen provisorium.

*Thryocephalon* J. R. et G. Forst. Char. Gen. Pl. (1776) 129, t. 65.

*Nomochloa* Beauv. ex Lestib. Ess. Fam. Cypérac. (1819) 37.

*Stenophyllus* Rafin. Neogen. (1825) 4.

[*Triodon* L. C. Rich. in Pers. Syn. I. (1805) 60, col. 1, n. 48, pro syn.]

*Neowashingtonia* Sudw. in U.S. Dep. Agric. Forestry Bull. No. 14 (1897) 105; No. 17 (1898) 38.

## NOMINA CONSERVANDA

## PALMAE

639. **Veltchia** H. Wendl. in Seemann, Fl. Vitiens. (1868) 270, t. 81; non Lindl. in Gard. Chron. (1861) 265.—T.: *V. Storchii* H. Wendl.

657. **Orbignya** Mart. ex Endl. Gen. (1837) 257; non Bert. in Mercurio Chileno (1829), 737.—T.: *O. phalerata* Mart.

660. **Maximiliana** Mart. Hist. Nat. Palm. II. (1823-50; 1824?) 131; non *Maximiliana* Mart. apud Schrank in Flora, II. (1819) 451.—T.: *M. regia* Mart.

## CYCLANTHACEAE

682. **Ludovia** Brongn. in Ann. Sc. Nat., Sér. 4, XV. (1861) 361; non Pers. Syn. II (1807) 576.—T.: *L. lancifolia* Brongn.

## RESTIONACEAE

808. **Leptocarpus** R. Br. Prodr. Fl. Nov. Holland. I. (1810) 250.—T.: *L. aristatus* R. Br.

## COMMELINACEAE

894. **Palisota** Reichb. [Consp. Reg. Veg. (1828) 59, nomen nudum] ex Endl. Gen. Pl. (1836) 125, in obs.—T.: *P. ambigua* (Beauv.) C. B. Clarke (*Commelina ambigua*).

## PONTEDERIACEAE

923. **Reussia** Endl. Gen. I. (1836) 139, n. 1089; non Dennst. Schluess. Hort. Malab. (1818) 33.—T.: *R. triflora* Seub.

## LILIACEAE

957. **Stenanthium** (A. Gray) Kunth, Enum. IV. (1843) 189.—T.: *S. angustifolium* (Pursh) Kunth.

962. **Scheilhamera** R. Br. Prodr. (1810) 273; non Moench, Meth., Suppl. (1802) 119.—T.: *S. undulata* R. Br.

## NOMINA REJICIENDA

*Englerophoeix* Kuntze, Rev. Gen. II. (1891) 723.

*Schoenodum* Labill. Nov. Holland Pl. Specim. II. (1805) 79; emend. Kunth, Enum. Pl. III. (1841) 445.

*Duchekia* Kostel. Allgem. Med. Pharm. Fl. I. (1831) 213.

*Anepsa* Rafin. Fl. Tellur. pars 4 (1836-38), 27.

*Pardinya* Salisb. Gen. Pl. (1866) 58, 59.

968. **Burchardia** R. Br. Prodr. (1810) 272; non Neck. Elem. II. (1790) 76.—T.: *B. umbellata* R. Br.
974. **Anguillaria** R. Br. Prodr. (1810) 273; non Gaertn. Fruct. I. (1788) 372.—T.: *A. dioica* R. Br.
1011. **Bowiea** Harv. ex Hook. f. in Bot. Mag. (1867) t. 5619; non Haw. in Phil. Mag. LXIV. (1824) 299.—T.: *B. volubilis* Harv.
1021. **Blandfordia** Sm. Exot. Bot. I. (Dec. 1804) 5, t. 4; non Andr. Bot. Rep. V. (Feb. 1804) t. 343.—T.: *B. nobilis* Sm.
1032. **Laxmannia** R. Br. Prodr. Fl. Nov. Holland. I. (1810) 285; non J. R. et G. Forst. Char. Gen. Pl. (1776) 93, t. 47; nec Schreb. in L. Gen. Pl. ed. 8, II. (1791) 800.—T.: *L. gracilis* R. Br.
1037. **Johnsonia** R. Br. Prodr. Fl. Nov. Holland. I. (1810) 287; non Dale ex Mill. Gard. Dict. Abridg. ed. 4, II. (1754); nec Adams. Fam. Pl. II. (1763) 343.—T.: *J. lupulina* R. Br.
1044. **Baxteria** R. Br. ex Hook. Lond. Journ. Bot. II. (1843) 492; non *Baxteria* Reichb. Consp. (1828) 131.—T.: *B. australis* R. Br.
1047. **Tulbaghia** L. Mant. II. (1771) 148; non Heist. Descr. Nov. Gen. Brunsvig. (1753) p. x., in obs., et in adnot., et Besch. Brunsvig. (1753) 15, in obs., et in adnot., nomen rejic.—T.: *T. capensis* L.
1055. **Bessera** Schult. f. in Linnaea, IV. (1829) 121; non Schult. Obs. Bot. (1809) 27; nec Spreng. Pugill. II. (1815) 90; nec Vell. Fl. Flum. (1825) 147.—T.: *B. elegans* Schult. f.
- Reya* Kuntze, Rev. Gen. II. (1891) 845.
- Anguillaraea* Post et Kuntze, Lexic. Gen. Phan. (1903) 276.
- Ophiobostryx* Skeels in U.S. Dep. Agric. Bur. Pl. Industry, Bull. 223 (1911), 45.
- Schizobasopsis* Macbride in Contrib. Gray Herb. n. s. LVI. (1918) 3.
- [*Barlingia* F. Muell. [ex Benth. Fl. Austral. VII. (1878) 63, in obs., nomen synonymum et] in Journ. and Proc. R. Soc. New S. Wales, XV. (1882) 232; non Reichb. in Flora, VII. pars 1 (1824), 241; nec Brongn. in Ann. Sc. Nat., Sér. I, X. (1827) 373.]
- Omentaria* Salisb. Gen. Pl. (1866) 87.
- Pharium* Herb. in Bot. Reg. XVIII. (1832) t. 1546.



## NOMINA CONSERVANDA

## LILIACEAE

1077. **Lloydia** Salisb. in Trans. Hort. Soc. I. (1812) 328; non *Lloydia* Neck. Elem. I. (1790) 4.—T.: *L. alpina* Salisb.—*L. serotina* (L.) Sweet.

1112. **Milligania** Hook. f. in Hook. Kew Journ. Bot. V. (1853) 296, t.9; non Hook. f. in Hook. Ic. Pl. (1840) t.299.—T.: *M. longifolia* Hook. f.

1140. **Ophiopogon** Ker-Gawl. in Bot. Mag. (1807) t.1063.—T.: *O. japonicus* Ker-Gawl.

## AMARYLLIDACEAE

1178. **Vallota** Herb. App. Bot. Reg. (1821) 29; non *Vallota* Adans. Fam. Pl. II. (1763) 495; T.: *V. purpurea*—*V. speciosa* (L.f.) Voss.

1181. **Zephyranthes** Herb. App. Bot. Reg. (1821) 36.—T.: *Z. Atamasco* (L.) Herb.

1236. **Lanaria** Ait. Hort. Kew. ed. 1, I. (1789) 462; non Adans. Fam. Pl. II. (1763) 225.—T.: *L. plumosa* Ait.

## DIOSCOREACEAE

1258. **Petermannia** F. Muell. Fragm. II. (1860) 92; non Klotzsch in Abh. Akad. Berlin, 1854 (1855), 74.—T.: *P. cirrosa* F. Muell.

## IRIDACEAE

1260. **Syringodea** Hook. f. in Bot. Mag. (1873) t.6072; non D. Don in Edinb. New Phil. Journ. XVII. (1834) 155.—T.: *S. pulchella* Hook. f.

1265. **Moraea** L. Sp. Pl. ed. 2 (1762), 59; Gen. Pl. ed. 6 (1764), 27.—T.: *M. juncea* L.

## NOMINA REJICIENDA

[*Rhabdocrinum* Reichb. Consp. (1828) 65, sine descr.]  
*Neckarobolbrium* Ledeb. Fl. Altaica, II. (1830) 36.

*Mondo* Adans. Fam. Pl. II. (1763) 496.

*Atamasco* (*Atamosko*) Adans. Fam. Pl. II. (1763) 57, 522.  
*Argolasia* Juss. Gen. (1789) 60.

*Morae* Mill. Fig. Pl. II. (1758) 159, t.239.

1302. *Ixia* L. Sp. Pl. ed. 2 (1762), 51, partim ; emend. Ker-Gawl. in König et Sims, Ann. Bot. I. (1804) 226, excl. sp. ; Baker in Journ. Linn. Soc., Bot. XVI. (1877) 90 ; non L. Sp. Pl. ed. 1 (1753), 36.—T. : *I. polystachya* L.

1313. *Micranthus* Eckl. Verz. Pflanzensamml. (1827) 43 ; non Wendl. Bot. Beob. (1798) 38, 39.—T. : *M. alopecuroides* (L.) Eckl.

#### ZINGIBERACEAE

1324. *Zingiber* Boehm. in Ludw. Defin. Gen. Pl. ed. Boehm. (1760) 89.—T. : *Z. officinale* Rosc. (*Anomum Zingiber* L.).

1328. *Alpinia* Roxb. in As. Research. XI. (1810) 350 ; non L. Sp. Pl. ed. 1 (1753), 2.—T. : *A. Galanga* (L.) Willd. (*Marantia Galanga* L. Sp. Pl. ed. 2 (1762), 3).

1331. *Rencaalmia* L. f. Suppl. (1781) 7.—T. : *R. exaltata* L. f. 1332. *Riedelia* Oliv. in Hook. Ic. Pl. XV. (1883) t. 1419 ; non Cham. in Linnaea, VII. (1832) 240 ; nec Meissn. in Mart. Fl. Bras. VII. (1863) 171 ; nec Trin. ex Kunth, Enum. Pl. I. (1833) 515, in syn.—T. : *R. curviflora* Oliv.

#### BURMANNIACEAE (nunc CORSIACEAE)

1386. *Arachnitis* Philippi in Bot. Zeit. XXII. (1864) 217 ; non *Arachnites* F. W. Schmidt, Fl. Boëm. I. (1793) 74.—T. : *A. uniflora* Philippi.

#### ORCHIDACEAE

1393A. *Paphiopedilum* Pfitz. [Morph. Stud. Orchideenbl. (1886) 11, in adnot., partim ; et] in Engl. et Prantl, Nat. Pflanzenfam. II. (1889), Abt. 6, 84, descr., partim ; emend. Rolfe in Orchid Rev. IV. (1896) 363.—T. : *P. insigne* (Wall.) Pfitz.

[*Hyalis* Salisb. in Trans. Hort. Soc. I. (1812) 317, sine descr.]

*Morphixia* Ker-Gawl. Irid. Gen. (1827) 105.

[*Freesia* Eckl. Verz. Pflanzensamml. (1827) 30, sine descr.]

*Wuerthia* Regel in Bot. Zeit. IX. (1851) 595.

*Beilia* Eckl. Verz. Pflanzensamml. (1827) 43 ; Kuntze, Rev. Gen. III. sect. 2, pars 2 (1898) 305.

*Zinziber* Mill. Gard. Dict. Abridg. ed. 4, III. (1754).

*Languas* Koenig in Retz. Observ. III. (1783) 64.

*Alpinia* L. Sp. Pl. ed. 1 (1753), 2. *Nyctophylax* Zipp. in Alg. Konst. en Letterb. I. (1829) 298.

*Achraclinis* Kuntze in Post et Kuntze, Lexic. Gen. Phan. (1903) 4.

*Cordula* Rafin. Fl. Tellur. IV. (1836)

46. *Stimegas* Rafin. l.c. 45.

## NOMINA CONSERVANDA

## ORCHIDACEAE

1397. **Serapias** L. Sp. Pl. ed. 1 (1753), 949, partim; emend. Swartz in Vet. Akad. Handl. Stockholm, XXI. (1800) 225.—T.: *S. lingua* L.

1408. **Holothrix** L. C. Rich. [in Mém. Mus. Hist. Nat. Paris, IV. (1818) 55, in obs., nomen nudum] ex Lindl. Gen. and Sp. Orchid. Pl. (1835) 257, 283.—T.: *H. hispidula* (L. f.) Dur. et Schinz (*Orchis hispidula* L. f.).

1430. **Satyrrium** Swartz in Vet. Akad. Handl. Stockholm, XXI. (1800) 214; non L. Sp. Pl. ed. 1 (1753), 944.—T.: *S. bicornis* (L.) Swartz.

1482. **Epipactis** [Zinn. Cat. Pl. Gott. (1757) 85, partim, nomen abortivum] Swartz in Vet. Akad. Handl. Stockholm, XXI. (1800) 232, partim; emend. L. C. Rich. in Mém. Mus. Hist. Nat. Paris, IV. (1818) 51, 60.—T.: *E. Helleborine* (L.) Crantz.

## NOMINA REJICIENDA

*Serapiastrum* Kuntze, Rev. Gen. III, sect. 2, pars 1 (1898), 141.

*Tryphia* Lindl. [in Edw. Bot. Reg. XX. (1834) sub t. 1701, nomen nudum] Gen. and Sp. Orchid. Pl. (1835) 258, 333.

*Scopularia* Lindl. in Edw. Bot. Reg. XX. (1834) sub t. 1701.

*Monotris* Lindl. loc. cit.

*Saccidium* Lindl. Gen. and Sp. Orchid. Pl. (1835) 258, 301.

*Diplecthrum* Pers. Syn. II. (1807) 508.

*Hipporkis* Thou. in Nouv. Bull. Soc. Philom. Paris, I. (1809) 317.

*Hipporchis* Thou. Fl. Hes Austr. Afr. Orch. (1822) Tabl. Genres, genus f, t. 21.

*Satyridium* Lindl. Gen. and Sp. Orchid. Pl. (1838) 345.

*Aniceps* Lindl. l.c.

*Serapias* L. Sp. Pl. ed. 1 (1753), 949, partim; Gen. Pl. ed. 5 (1754), 406, partim; emend. Kuntze, Rev. Gen. III, sect. 2, pars 1 (1898), 141.

[*Helleborine* Mill. Gard. Dict. Abridg. ed. 4 (1754) partim, nomen abortivum; Schinz et Thell. in Schinz et Keller, Fl. Schweiz, ed. 4, I. (1923) 166.]

[*Helleborine* Hill, Brit. Herbal (1756), 477, nomen abortivum ; emend. Druce in Ann. Scott. Nat. Hist. (1905) 48 ; Druce, List Brit. Pl. (1908) 67 ; Lond. Cat. Brit. Pl. ed. 10 (1908), 37.]

*Amesia* A. Nels. et Macbr. in Bot. Gaz. LVI. (1913) 472 ; Ames, Enum. Orch. U.S. and Can. (1924) 13.

[*Centrosis* Swartz, Adnot. Bot. (1829) 52 ; non Thun. (1822)]

*Jonorchis* Beck, Fl. Niederösterr. (1890) 215.

*Lequestia* Bubani, Fl. Pyren. II. (1901) 57.

*Collea* Lindl. in Edw. Bot. Reg. IX. (1823) sub t. 760, in obs.

*Anecochilus* Blume, Bijdr. (1825) 411.  
*Chrysobaphus* Wall. Tent. Fl. Nepal. Illustr. (1826) 37.

*Adenoslytis* Blume, Bijdr. (1825) 414 ; non *Adenoslytes* Cass. in Dict. Sc. Nat. I. Suppl. (1816) 59.

*Cythera* [Salisb. in Trans. Hort. Soc. I. (1812) 301, nomen nudum] House in Bull. Torr. Bot. Club, XXXII. (1905) 383.

*Orchidium* Swartz, Summa Veg. Scand. (1814) 32, et in Svensk. Bot. (1819) t. 518.

1483. **Limodorum** L. C. Rich. in Mém. Mus. Hist. Nat. Paris, IV. (1818) 50 ; non L. Sp. Pl. ed. 1 (1753), 950.—T. : *L. abortivum* Swartz.

1488. **Pelexia** Poit. ex [L. C. Rich. in Mém. Mus. Hist. Nat. Paris, IV. (1818) 59, nomen nudum] Lindl. in Edw. Bot. Reg. XII. (1826) sub t. 985.—T. : *P. adnata* (Swartz) Spreng. (*Neottia adnata* (Swartz) Swartz).

1500. **Anoectochilus** Blume, Pl. Jav. (1828) praef. p. vi. in adnot.—T. : *A. setaceus* (Blume) Lindl. (*Anecochilus setaceus*).

1502. †**Zeuxine** ("Zeuxina") Lindl. Collect. Bot., App. (1826) n. 18 ; Lindl. Orch. Seel. (1826) 9.—T. : *Z. sulcata* Lindl.

1559. **Calypso** Salisb. Parad. Lond. (1807), t. 89 ; non Thun. Hist. Vég. Isles de France etc. ed. 1, I. (1804) 29, t. 6.—T. : *C. bulbosa* (L.) Oakes.

## NOMINA CONSERVANDA

## ORCHIDACEAE

1569. **Cladaria** Hook. f. Fl. Brit. Ind. V. (1890) 810; non Rafin. Sylv. Tellur. (1838) 12.—T.: *C. viridiflora* Hook. f.  
 1614. **Epidendrum** L. Sp. Pl. ed. 2 (1763), 1347; Gen. Pl. ed. 6 (1764), 464; emend. Swartz in Nov. Act. Soc. Sc. Upsal. VI. (1799) 66, t. 5, fig. 2, et in Schrad. Neues Journ. Bot. II. (1799) 209, t. 1, fig. 2; Lindl. Gen. and Sp. Orchid. Pl. (1831) 96; non L. Sp. Pl. ed. 1 (1753), 952.—T.: *E. nocturnum* Jacq.  
 1617. **Laelia** Lindl. Gen. and Sp. Orchid. Pl. (1831) 96, 115; non Adams. Faun. Pl. II. (1763) 423.—T.: *L. grandiflora* (La Llave et Lex.) Lindl.  
 1704. **Cirrhopetalum** Lindl. [in Edw. Bot. Reg. X. (1824) sub t. 832, nomen nudum] Gen. and Sp. Orchid. Pl. (1830) 58.—T.: *C. Thouarsii* Lindl. (*Bulbophyllum longiflorum* Thou.).
1714. **Panisea** (Lindl.) Lindl. Fol. Orchid. (1854).—T.: *P. parviflora* (Lindl.) Lindl. (*Coelogyne parviflora* Lindl.).  
 1739. **Warmingia** Reichb. f. Otia Bot. Hamburg. (1881) 87; non Engl. in Mart. Fl. Bras. XII. pars 2 (1874), 86, 92.—T.: *W. Eugeniai* Reichb. f.  
 1751. **Bracthia** Reichb. f. in Linnaea, XXII. (1849) 853; non Trevisan, Algae Cocot. (1848) 57.—T.: *B. glumacea* Reichb. f.  
 1778. **Miltonia** Lindl. in Edw. Bot. Reg. XXIII. (1837) sub t. 1976, in obs.—T.: *M. spectabilis* Lindl.  
 —. **Symphyglossum** Schlechter in Orchis, XIII. (1919) 8; non *Symphyglossum* Turcz. in Bull. Soc. Nat. Mosc. XXI. pars 1 (1848), 255.—T.: *S. sanguineum* (Reichb. f.) Schlechter.

## NOMINA REJICIENDA

*Phacrosanthus* (*Phadrosanthus*) Nees.  
 Elem. III. (1790) 133, partim.

*Amalia* Reichb. Nom. I. (1841) 52.

*Zygoglossum* Reinw. [ex Bl. Cat. Gewass. Lands Plantent. Buitenz. (1823) 100, nomen nudum] apud Hornsch. in Sylv. Pl. Nov., Ratisb. II. (1828) 4.  
*Ephippium* Blume, Bijdr. (1825) 308.  
*Hippoglossum* Breda, Gen. et Sp. Orchid. (1827).

*Androgyne* Griff. Notul. Pl. As. III. (1851) 279.

*Oncodia* Lindl. Fol. Orchid. (Feb. 1853).

*Gynizodon* Rafin. Fl. Tellur. IV. (1836) 40.

ULMACEAE

1904. **Aphananthe** Planch. in Ann. Sc. Nat., Sér. 3, X. (1848) 265, 337; non Link, Enum. Hort. Berol. I. (1821) 383.—T.: *A. philippinensis* Planch.

MORACEAE

1923. **Broussonetia** L'Hérit. ex Vent. Tabl. III. (1799) 547; non Ortega, Nov. Pl. Descr. Decad. (1798) 61, t. 7.—T.: *B. papyrifera* (L.) Vent.  
1937. **Clarisia** Ruiz et Pav. Fl. Peruv. et Chil. Prodr. (1794) 128, t. 28; non Abat in Act. Soc. Med. Sevilla, X. (1792) 418.—T.: *C. racemosa* Ruiz et Pav.  
1942. **Cudrania** Tréc. in Ann. Sc. Nat., Sér. 3, VIII. (1847) 122, t. 3, ff. 76–85.—T.: *C. javanensis* Tréc.

URTICACEAE

1987. **Pellionia** Gaudich. in Freyc. Voy. Bot. (1826) 494, t. 119.—T.: *P. elatostemoides* Gaudich.  
1988. **Elatostema** J. R. et G. Forst. Char. Gen. Pl. (1776) 105, partim; emend. Wedd. Monogr. Urtic. (1856) 290.—T.: *E. sessile* J. R. et G. Forst.

PROTEACEAE

2068. **Banksia** L. f. Suppl. Pl. (1781) 15; non J. R. et G. Forst. Char. Gen. Pl. (1776) 7, t. 4.—T.: *B. serrata* L. f.

LORANTHACEAE

2074. **Loranthus** L. Sp. Pl. ed. 2 (1762), 472; non L. Sp. Pl. ed. 1 (1753), 331.—T.: *L. Scurrula* L.

SANTALACEAE

2120. **Quinchamalium** Juss. Gen. (1789) 75; non Molina, Saggio Chile, ed. 1 (1782) 151.—T.: *Q. chilense* Mol. emend. Lam.

*Homoioceltis* Blume, Mus. Bot. Lugd.-Bat. II. (1852) 64, t. 34.

*Papyrus* Lam. Illustr. (1798) t. 762.

*Soaresia* Fr. Allem. in Rev. Bras. I. (1857) 210, homonymum rejiciendum.

*Vanieria* Lour. Fl. Cochinch. (1790) 564.

*Polychroa* Lour. Fl. Cochinch. (1790) 559.

*Langueveldia* Gaudich. in Freyc. Voy. Uranie, Bot. (1826) 494.

*Simuclera* Kuntze, Rev. Gen. II. (1891) 581.

*Scurrula* L. Sp. Pl. ed. 1 (1753), 110; Gen. Pl. ed. 5 (1754), 48.

## NOMINA CONSERVANDA

## POLYGONACEAE

2208. *Muehlenbeckia* Meissn. Gen. 316, Comm. 227 (1840).—  
T.: *M. australis* (Forst.) Meissn.

## AMARANTHACEAE

2312. *Cyathula* Blume, Bijdr. (1825) 548; non Lour. Fl.  
Cochinch. I. (1790) 101.—T.: *C. prostrata* (L.) Blume.

## NYCTAGINACEAE

2350. *Bougainvillea* Comm. corr. Spach, Veg. Phan. X. (1841)  
516.—T.: *B. spectabilis* Willd.

## PORTULACACEAE

2412. *Anacampseros* Sims, Bot. Mag. XXXIII. (1811) t. 1367;  
non Mill. Gard. Dict. Abridg. ed. 4 (1754); nec. P. Br. Nat. Hist. Jam.  
(1756) 234.—T.: *A. filamentosa* (Haw.) Sims.

## CARYOPHYLLACEAE

2432. *Moenchia* Ehrh. Beitr. II. (1788) 177; non Roth, Tent.  
Fl. Germ. I. (1788) 273.—T.: *M. quaternella* Ehrh. = *M. erecta* (L.)  
Gaertn. Mey. et Scherb.

2467. *Pollichia* Soland. in Ait. Hort. Kew. ed. 1, I. (1789) 5;  
non Schrank in Acta Acad. Mogunt. Erfurt (1781), 35; nec Medik.  
Bot. Beob. (1783) 247, nom. rejic.—T.: *P. campestris* Soland.

## NOMINA REJICIENDA

- Calacinum* Rafin. Fl. Tellur. II.  
(1836) 33.

- Karkinetron* Rafin. l.c. III. (1836)

11. *Sarcogonum* G. Don in Sweet, Hort.  
Brit. ed. 3 (1839), 557.

- [Nomen *Desmochaeta* DC. Cat. Hort.  
Monsp. (1813) 101, a. b. Hiern. Cat.  
Afr. Pl. Welw. (1900) 890 pro hoc genere  
acceptum revera pro synonymo *Pupaliae*  
adjudicandum.]

- Buginillaea* Comm. ex Juss. Gen.  
(1789) 91.

- Ruelingia* Ehrh. Beitr. III. (1788)  
132, nomen rejic.

- Telephiastrum* Medik. Phil. Bot. I.  
(1789) 100.

- Alsincella* Moench, Meth. (1794) 222.

- Meerburghia* Moench, Meth., Suppl.  
116 (1802).

NYMPHAEACEAE

2513. *Nymphaea* L. Sp. Pl. ed. 1 (1753), 510, partim; emend. Smith in Sibth. et Smith, Fl. Graec. Prodr. I. (1808-9) 360.—T.: *N. alba* L.  
 2514. *Nuphar* Smith in Sibth. et Smith, Fl. Graec. Prodr. I. 361 (1808 anno exeunte vel 1809).—T.: *N. luteum* (L.) Sibth. et Sm.

CALYCANTHACEAE

- 2663, partim. *Chimonanthus* Lindl. in Bot. Reg. V. (1819) sub t. 404.—T.: *C. praecox* (L.) Link.

ANNONACEAE

2684. *Cananga* Hook. f. et Thoms. Fl. Ind. I. (1855) 129; non Aubl. Hist. Pl. Guian. Franç. I. (1775) 607.—T.: *C. odorata* (Lam.) Hook. f. et Thoms. (*Uvaria odorata*).

MONIMIACEAE

2759. *Peumus* Mol. Saggio Chile, 185, 350 (1782), partim; emend. Pers. Syn. II. 629 (1807); non Mol. (1782) quoad sp. typ.—T.: *P. Boldus* Mol.

LAURACEAE

2790. *Nectandra* Roland. ex Rottboell in Acta Litt. Univ. Hafn. I. (1778) 279; non Berg. Descr. Fl. Cap. (1767) 131.—T.: *N. sanguinea* Roland. ex Rottb.  
 2804. *Bernieria* Baill. in Bull. Soc. Linn. Paris, I. (1884) 434; non *Berniera* DC. Prodr. VII. (1838) 18.—T.: *B. madagascariensis* Baill.

- Castalia* Salisb. in Ann. Bot. II. No. 4 (1805), 71.

- Nymphaea* L. Sp. Pl. ed. 1 (1753), 510, partim; emend. Salisb. in Ann. Bot. II. No. 4 (1805), 71.

- Nymphoanthus* L. C. Rich. Anal. du Fruit, 63, 68 (*Nymphosanthus*) 103 (Maio 1808); Ann. Mus. Paris, XVII. (1811) 230.

- Meratia* Lois. Herb. Gén. Amat. (1818) t. 173.

- Fitzgeraldia* F. Muell. Fragm. Phyt. Austral. VI. (1867) 1.  
*Canangium* Baill. Hist. Pl. I. (1868) 213.

- Boldu* Feuill. ex. Adans. Fam. Pl. II. (1763) 446.

- Porostema* Schreb. Gen. II. (1791) 519.



## NOMINA CONSERVANDA

## LAURACEAE

- 2811, partim. **Endlicheria** Nees in Linnæa, VIII. (1853) 37.—  
T.: *E. hirsuta* (Schott) Nees.  
2821. **Lindera** Thunb. Nov. Gen. III. (1783) 44; Blume in Mus.  
Bot. Lugd.-Bat. I. (1851) 323; non Adams, Fam. Pl. II. (1763) 499.  
—T.: *L. umbellata* Thunb.

## CRUCIFERAE

2884. **Coronopus** Boehm. in Ludw. Def. Gen. Pl. ed. 3 (1760),  
22; Gaertn. Fruct. II. (1791) 293; non Mill. Gard. Dict. Abridg. ed.  
4 (1754).—T.: *C. procumbens* Gilib.  
2902. **Bivonaea** DC. in Mém. Hist. Nat. Mus. Paris, VII.  
(1821) 241; Syst. II. (1821) 554; non *Bivonea* Rafin. Fl. Ludov.  
(1817) 138; nec *Bivonia* Spreng. Neue Entdeck. II. (1821) 116.—T.:  
*B. lutea* DC.  
2940. **Schouwia** DC. Syst. II. (1821) 643; non Schrad. Gött.  
Gel. Anz. (1821) 717.—T.: *S. arabica* DC. = *S. purpurea* (Forsk.)  
Schweinf.  
2973. **Mancoa** Wedd. Chloris And. I. (1857) t. 86; non Rafin.  
Fl. Tellur. III. (1836) 56.—T.: *M. hispida* Wedd.  
3022. †**Lepidostemon** Hook. f. et Thoms. in Journ. Linn. Soc.  
V. (1861) 131; non *Lepistemon* Blume, Bijdr. 722 (1825); Hassk. Cat.  
Pl. Hort. Bogor. (1844) 141.—T.: *L. pedunculatus* Hook. f. et Thoms.  
3042. **Matthiola** R. Br. ("Matthiola") in Ait. Hort. Kew. ed. 2,  
IV. (1812) 119; non L. Sp. Pl. ed. 1 (1753), 1192.—T.: *M. incana*  
R. Br.  
3050. †**Dontostemon** Andrzej. ex [DC. Prodr. I. (1824) 190, pro  
syn.:] Ledeb. Fl. Alt. III. (1831) 4, 118.—T.: *D. integrifolius* (L.)  
Ledeb.

## NOMINA REJICIENDA

- Schænera* Nees in Lindl. Introd. Nat.  
Syst. ed. 2 (1836), 202, in adnot.  
*Benzoia* Fabricius, Enum. Pl. Hort.  
Helmsl. ed. 2 (1763), 401.

*Carara* Medic. Pflanzenzuggatt. I. (1792)  
34.

*Pastorea* Tod. ex Bertol. Fl. Ital. X.  
(1854) 520.

*Subularia* Forsk. Fl. Aegypt. Arab.,  
(1775) 117; non L. (1753).  
*Cyclopterygium* Hochst. in Flora,  
XXXI. (1848) 175.

*Andreoskia* DC. in DC. Prodr. I.  
(1824) 190; non *Andreioskeskia* Reichb.  
Iconogr. Bot. seu Pl. Crit. I. (1823) 15,  
t. 13.

3051. *Chorispora* R. Br. ex DC. Syst. II. (1821) 435.—T.:  
*C. tenella* (Pall.) DC.

TOVARIACEAE

3081. *Tovaria* Ruiz et Pav. Fl. Peruv. et Chil. Prodr. (1794)  
49, t. 8; non Neck. Elem. III. (1790) 190, nomen rejic.—T.:  
*T. pendula* Ruiz et Pav.

CAPPARIDACEAE

3106. *Boscia* Lam. Encycl. Méth., Illustr. Genr. (1797) t. 395;  
non Thunb. Prodr. Fl. Cap. (1794) pp. x. et 32.—T.: *B. senegalensis*  
(Pers.) Lam. ex Poir. (*Podoria senegalensis*).

CRASSULACEAE

3171. *Roechea* DC. Pl. Hist. Succul. (1806?) t. 103; non Scop.  
Introd. (1777) 296.—T.: *R. coccinea* (L.) DC.

SAXIFRAGACEAE

3182. *Bergenia* Moench, Meth. (1794) 664; non *Bergenia*  
Adams, Fam. Pl. II. (1763) 345; nec *Bergenia* Neck. Elem. II. (1790)  
108.—T.: *B. bifolia* Moench=*B. crassifolia* (L.) Fritsch.

3185. *Boykinia* Nutt. in Journ. Acad. Nat. Sc. Philad. VII.  
(1834) 113; non Rafin. Neogen. (1825) 2.—T.: *B. aconitifolia* Nutt.

3204. *Donatia* J. R. et G. Forst. Char. Gen. Pl. (1776) 9, t. 5  
(nunc Stylidiac.); non Loeffl. Iter. Hispan. (1758) 193.—T.:  
*D. fascicularis* J. R. et G. Forst.

3209. *Jamesia* Torr. et Gray, Fl. N. Amer. I. (1840) 593; non  
Rafin. in Atl. Journ. (1832) 145.—T.: *J. americana* Torr. et Gray.

*Ormycarpus* Neck. Elem. III. (1790)  
82.  
*Chorispermum* R. Br. in Ait. Hort.  
Kew. ed. 2, IV. (1812) 129.

[*Cavaria* Steud. Nom. ed. 1 (1821),  
169, nomen].  
[*Baucroflia* Macf. Fl. Jam. I. (1837)  
112; non Billb. (1833).]

*Podoria* Pers. Syn. II. (1806) 5.

*Larochea* Pers. Syn. I. (1805) 337.

*Geryonia* Schrank in Flora, I. (1818)  
230.

*Megasea* Haw. Saxifr. Enum. (1821) 6.

*Therophon* Rafin. N. Am. Pl. IV. (1836)  
66.

*Telesonix* Rafin. Fl. Tellur. II. (1836)  
69.

[*Orites* Banks et Soland. ex Hook. f.  
Bot. Antarct. Voy. I. pars 2 (1846),  
282, pro syn.]

*Edwinia* Heller in Bull. Torr. Bot.  
Club, XXIV. (1897) 477.

## NOMINA CONSERVANDA

## CUNONIACEAE

3269. **Platylophus** D. Don in Edinb. New Phil. Journ. IX. (1830) 92; non Cass. in Dict. Sc. Nat. XLIV. (1826) 36.—T.: *P. trifoliatius* D. Don.

## BRUNIACEAE

3284. **Thamnea** Soland. ex R. Br. in Abel. Narr. Journ. (1818) 374, nomen; et ex Brongn. in Ann. Sc. Nat. VIII. (1826) 386, t. 38; non *Thamnia* P. Br. Hist. Jam. (1756) 245.—T.: *T. uniflora* Soland.  
3285. **Tittmannia** Brongn. in Ann. Sc. Nat. VIII. (1826) 385; non Reichb. Ic. Exot. I. (1824) 26, t. 38.—T.: *T. lateriflora* Brongn. —*T. laxa* (Thunb.) Presl.

## ROSACEAE

3328. **Lindleya** H. B. K. Nov. Gen. et Sp. VI. (1823) 239; non Nees in Flora, IV. (1821) 299, nom. rejic.; nec H.B.K. Nov. Gen. et Sp. V. (1821) tt. 479 et 480; Kunth, Malvac. (1822) 10.—T.: *L. mespiloides* H.B.K.

3377. **Aremonia** Neck. Elem. II. (1790) 100.—T.: *A. Agrimononoides* (L.) DC.

## LEGUMINOSAE

3448. **Schrankia** Willd. Sp. Pl. IV. (1806) 1041; non Medic. Pflanzengatt. I. (1792) 42.—T.: *S. quadrivalvis* (L.) Merr. (*S. aculeata* Willd.)

3452. **Dichrostachys** Wight et Arn. Prodr. I. (1834) 271.—T.: *D. cinerea* (L.) Wight et Arn.

3509. **Afzelia** Sm. in Trans. Linn. Soc. IV. (1798) 221; non J. F. Gmelin, Syst. Nat. ed. 13, II. (1791) 927.—T.: *A. africana* Sm.

3516. **Berlinia** Soland. ex Hook. f. et Benth. in Hook. Niger Fl. (1849) 326.—T.: *B. acuminata* Soland.

## NOMINA REJICIENDA

*Trincrisma* C. Presl, Bot. Bemerk. (1844) 73.

*Schinzafra* Kuntze, Rev. Gen. I. (1891) 234.

*Moesslerera* Reichb. Consp. (1828) 160.

*Lindleyella* Rydb. in N. Amer. Fl. XXII. (1908) 259.

*Agrimononoides* Mill. Gard. Dict. Abridg. ed. 4 (1754).

*Leptoglottis* DC. Mém. Leg. (1825) 451.

*Morongia* Britton in Mem. Torr. Bot. Cl. V. (1894) 191.

*Cailthea* Guill. et Perr. Fl. Seneg. (1833) 239.

*Afrafzelia* Pierre, Fl. For. Cochinch. V. (1899) sub t. 388.

*Westia* Vahl in Skrivt. Naturh.-Selsk. VI. (1810) 117.

*Apuleya* Gleason in Phytologist, I.  
(1935) 143.

[*Allantia* Benth. in Hook. Lond. Journ.  
Bot. II. (1840) 91; non Endl. (1836).]

*Acosmium* Schott in Spreng. Syst.  
IV. Cur. Post. (1827) 406.

*Gigantthemum* Welw. Apont. Phyto-  
geogr. (1859) 585 (Annaes de Conselho  
Ultramario, Ser. I.: Dec. 1858).

*Andrastis* Rafin. ex Kunth in Ann.  
Mus. Wien, II. (1838) 86.

*Xylothemia* Greene in Pittonia, II.  
(1891) 188.

[*Dilleynia* Roth, Cat. Bot. III. (1806)  
71; non Sm. (1805).]

*Westonia* Spreng. Syst. III. (1826)  
152, 230.

*Jacksonago* Kuntze, Rev. Gen. I.  
(1891) 191.

3532. **Apuleia** Mart. Herb. Fl. Bras. (1837) 123 (in Flora,  
Beibl. (1837) II.); non Gaertn. Fruct. II. (1791) 439.—T.: *A.*  
*praecox* Mart. = *A. leiocarpa* (Vogel) Macbr.

3558. **Zuccagnia** Cav. Icon. V. (1799) 2, t. 403; non *Zuccangnia*  
Thunb. Nov. Gen. Pl. IX. (1798) 127; nec *Zuccagnia* Thunb. in  
Roemers Arch. II. pars 1 (1799), 2.—T.: *Z. punctata* Cav.

3575. **Aldina** Endl. Gen. (1841) 1322; non Adans. Fam. Pl. II.  
(1763) 328; nec *Aldinia* Scop. Introd. (1777) 173.—T.: *A. insignis*  
(Benth.) Endl. (*Allantia insignis*).

3582. **Sweetia** Spreng. Syst. II. (1825) 171, 213; non DC. Prodr.  
II. (1825) 381.—T.: *S. fruticosa* Spreng.

3589. **Camoënsia** Welw. ex Benth. et Hook. f. Gen. Pl. I.  
(1865) 557.—T.: *C. maxima* Welw. ex Benth.

3608. **Virgilia** Lam. Illustr. II. (1793) 454, t. 326; non L. Hérit.  
Diss. (1788), et ex DC. Prodr. V. (1836) 652.—T.: *V. capensis* Lam.

3619. **Pickeringia** Nutt. ex Torr. et Gray, Fl. N. Amer. I.  
(1840) 389; non Nutt. in Journ. Acad. Sc. Philad. VII. (1834) 95.—  
T.: *P. montana* Nutt.

3647. **Walpersia** Harv. in Harv. et Sond. Fl. Cap. II. (1861)  
26; non Reissek ex Endl. Gen. (1839) 1100, n. 5736; nec Meissn. ex  
Krauss in Flora, XXVII. (1844) 357.—T.: *W. burtonioides* Harv. et  
Sond.

3659. **Rothia** Pers. Syn. II. (1807) 638; non Schreb. Gen.  
(1791) 531; nec Lam. in Journ. Hist. Nat. Paris, I. (1792) 16;  
nec Borkh. Tent. Dispos. Fl. Germ. (1792) 43.—T.: *R. trifoliata*  
(Roth) Pers. = *R. indica* (L.) Druce.

3661. **Wiborgia** Thunb. Nov. Gen. et Spec. X. (1800) 137;  
non Roth, Cat. Bot. II. (1800) 112; nec *Viborgia* Moench, Meth.  
(1794) 132.—T.: *W. obcordata* Thunb.

NOMINA CONSERVANDA

LEGUMINOSAE

3676. **Petteria** C. Presl, Bot. Bemerk. (1844) 139; Abh. Boehm. Ges. Wiss., Ser. 5, III. (1845) 569; non *Petteria* Reichb. Ic. Fl. Germ. V. (1841) 33, t.220; Nomencl. (1841) 205.—T.: *P. ramentacea* C. Presl.

3709. **Dalea** Juss. Gen. (1789) 355; non Mill. Gard. Dict. Abridg. ed. 4 (1754); nec P. Br. Hist. Jam. (1756) 239; nec P. Br. Ic. (1756) 314; nec Gaertn. Fruct. I. (1788) 235, t. 51.—T.: *D. alopecuroides* Willd (*Psoralea Dalea* L.)

3745. **Cracca** Benth. in Vidensk. Meddel. Nat. For. Kjøbenh. (1853) 8; non L. Sp. Pl. ed. 1 (1753), 752, nom. rejic.; nec Medic. Vorles. Churpf. Phys. Ges. II. (1787) 359.—T.: *C. glandulifera* Benth.

3754. **Sutherlandia** R. Br. in Ait. Hort. Kew. ed. 2, IV. (1812) 327; non J. F. Gmel. Syst. II. (1791) 1027.—T.: *S. frutescens* (L.) R. Br.

3784. **Nissolia** Jacq. Enum. Pl. Carib. (1760) 7; non Mill. Gard. Dict. Abridg. ed. 4 (1754).—T.: *N. fruticosa* Jacq.

3789. **Poiretia** Vent. Choix (1803), t. 42; non J. F. Gmel. Syst. II. (1791) 263; nec Cav. Icon. IV. (1797) 25, t.343.—T.: *P. scandens* Vent.

3853. †**Lens** Mill. Gard. Dict. Abridg. ed. 4 (1754); Druce in Rep. Bot. Exch. Cl. Brit. Isles, III. (1913) 433 [non Stickmann, Herb. Amb. (1754) 18, et L. Amoen. Acad. IV. (1760) 128, 143, nomen, sine descr., icone Rumphiana citata].—T.: *L. esculenta* Moench.

3863. **Shuteria** Wight et Arn. Prodr. Fl. Pen. Ind. Or. I. (1834) 207; non *Shuteria* Choisy in Mém. Soc. Genève, VI. (1833) 485.—T.: *S. vestita* (Graham) Wight et Arn.

*Parosela* Cav. Descr. Pl. (1802) 185.

*Benthmantha* Alef. in Bonplandia, X. (1862) 264.

3871. †**Rhodopis** Urb. Symb. Antill. II. (1900) 304; non *Rhodopsis* Lijia, Fl. Sverig. Suppl. I. (1840) 42; nec Reichenb. Nom. (1841) 168.—T.: *R. planisiliqua* (L.) Urb. (*Erythrina planisiliqua*).

3874. **Aptos** Medik. in Vorles. Churpf. Phys.-ökon. Ges. II. (1787) 573; Moench, Meth. (1794) 165.—T.: *A. americana* Medik. = *A. tuberosa* Moench 1794.

#### GERANIACEAE

3931. **Wendtia** Meyen, Reise, I. (1834) 307; non *Wendia* Hoffm. Gen. Umbellif. (1814) 136.—T.: *W. gracilis* Meyen.

3932. **Balbisia** Cav. in Anal. Cienc. Nat. VIII. (1804) 62; non Willd. Sp. Pl. III. (1803) 2214; nec DC. in Guillem. Arch. Bot. II. (1833) 233, et in DC. Prodr. VI. (1837) 447.—T.: *D. verticillata* Cav.

#### HUMIRIACEAE

3953. **Humiria** Jaume St. Hil. Expos. II. (1805) 374.—T.: *H. balsamifera* (Aubl.) Jaume St. Hil.

#### ZYGOPHYLLACEAE

3967. †**Augea** Thunb. Prodr. Fl. Cap. (1794) 80; non Thunb. ex Retz. Obs. V. (1789) 3, nomen; nec *Augea* Lour. Fl. Cochinch. (1790) 537, nomen confusum.—T.: *A. capensis* Thunb.

3973. **Larrea** Cav. in Anal. Hist. Nat. II. (1800) 229; Cav. Ic. VI. 39; non Ortega, Nov. Pl. Descr. Decad. (1797) 15, t. 2.—T.: *L. nitida* Cav.

#### RUTACEAE

3998. **Pentaceras** Hook. f. in Benth. et Hook. f. Gen. Pl. I. (1862) 298; non *Pentaceros* G. F. W. Meyer, Prim. Fl. Esseq. (1818) 136 = *Pentaceras* Roem. et Schultes, Syst. V. (1819) 570.—T.: *P. australis* (F. Muell.) Hook. f.

*Glycyne* L. Gen. Pl. ed. 5 (1754), 334; L. Sp. Pl. ed. 1 (1753), 753, partim, quoad spec. 1.

*Bradlea* Adans. Fam. Pl. II. (1763) 324, 527, quoad syn. *Aptos* Corn.

*Hyperum* C. Presl, Epim. Bot. (1849) 211.

*Ledocarpon* Desf. in Mém. Mus. Hist. Nat. Paris, IV. (1818) 250.

*Houmuri* Aubl. Hist. Pl. Guiane Franç. I. (1775) 564, t. 225.

*Piotes* Soland. apud Britt. in Journ. Bot. XXII. (1884) 147.

*Covillea* Vail in Bull. Torr. Bot. Cl. XXII. (1895) 229.

## NOMINA CONSERVANDA

## RUTACEAE

4011. **Boenninghausenia** Reichb. Consp. (1828) 197, sine descr., et apud Meissn. Gen. I. (1837), 60, II (1836-43), 44; non *Boenninghausia* Spreng. Syst. III. (1826) 153, 245.—T.: *B. albiflora* (Hook.) Meissn.

4012, partim. **Haplophyllum** A. Juss. corr. Reichb. Handb. (1837) 282.—T.: *H. tuberculatum* A. Juss.

4020. **Myrtopsis** Engl. in Engl. et Prantl, Nat. Pflanzenfam. III. pars 4 (1896), 137; non O. Hoffm. in Linnaea, XLIII. (1881) 133.—T.: *M. novae-caledoniae* Engl.

4060. **Naudinia** Planch. et Lind. in Ann. Sc. Nat., Sér. 3, XIX. (1853) 79; non Rich. in Sagra, Hist. Fis. Cuba (1845), 561.—T.: *N. amabilis* Planch. et Lind.

4065. **Chloroxylon** DC. in DC. Prodr. i. 625 (1824); non *Chloroxylum* P. Br. Nat. Hist. Jam. (1756) 187, t. 7, f. 1.—T.: *C. Swietenia* DC. (*Swietenia Chloroxylon* Roxb.).

4073. **Araliopsis** Engl. in Engl. et Prantl, Nat. Pflanzenfam. III. pars 4 (1896), 175; non Kurz in Andaman Rep. (1870) 39; nec Lesq. (1878?) plant. fossil.—T.: *A. Soyauzii* Engl.

4089. **Micromelum** Blume, Bijdr. (1825) 137.—T.: *M. pubescens* Blume.

## SIMAROUBACEAE

4118. **Castela** Turp. in Ann. Mus. Paris, VII. (1806) 78, t. 5; non *Castelia* Cav. in Anal. Cienc. Nat. III. (1801) 134, t. 30.—T.: *C. depressa* Turp.

## MELIACEAE

4189. **Aglaiia** Lour. Fl. Cochinch. (1790) 173; non Allemão in Nov. Act. Nat. Cur. IV. (1770) 93.—T.: *A. odorata* Lour.

## NOMINA REJICIENDA

*Podostaurus* Jungh. in Nat. et Geneesk. Arch. II. (1845) 45.

*Aplophyllum* A. Juss. in Mém. Mus. Hist. Nat. Paris, XII. (1825) 464.

*Aulacia* Lour. Fl. Cochinch. (1790) 273.

*Camunium* Adans. Fam. Pl. II. (1763) 166.

## MALPIGHIACEAE

4222. **Rhyssopterys** Blume corr. Wittst. Etym. Handwörterb. ed. 2 (1856), 764.—T.: *R. timorensis* Adr. Juss.  
 4226. **Heteropteris** H. B. K. Nov. Gen. V. (1822) 163.—T.: *H. purpurea* (L.) DC.  
 4234. **Ptilochaeta** Turcz. in Bull. Soc. Nat. Mosc. XVI. (1843) 52, et in Flora, XXVII. (1844) 120; non Nees in Mart. Fl. Bras. II. pars 1 (1842), 147, t. 8.—T.: *P. bahiensis* Turcz.  
 4247. **Lophanthera** Adr. Juss. in Ann. Sc. Nat., Sér. 2, XIII. (1840) 328; non Rafin. New Fl. Amer. II. (1836) 58.—T.: *L. Kunthiana* Adr. Juss. = *L. longifolia* (Kunth) Griseb.

## POLYGALACEAE

4275. **Securidaca** L. [Gen. Pl. ed. 5 (1754) 316 pro minore parte] Syst. ed. 10 (1759) 1155; non L. Sp. Pl. ed. 1 (1753), 707.—T.: *S. diversifolia* (L.) Blake (*S. volubilis* L. 1759 non 1753).  
 4277. **Salomonina** Lour. Pl. Cochinch. (1790) 14; non Heist. ex Fabricius, Enum. Pl. Hort. Helmsd. ed. 2 (1763), 38.—T.: *S. cantoniensis* Lour.

## EUPHORBACEAE

4331. **Buraevia** Baill. in Adansonia, XI. (1873) 83; non *Buraeva* Baill. in Adansonia, I. (1860) 71.—T.: *B. carunculata* (Baill.) Baill.  
 4397. **Adelia** L. Syst. ed. 10, II. (1759) 1298, partim; non P. Br. Nat. Hist. Jam. (1756) 361; nec Britton et Wilson, Bot. Porto Rico and Virg. Isl. V. (1924) 487.—T.: *A. Ricinella* L.  
 4415. **Acidoton** Swartz, Prodr. Veg. Ind. Occ. (1788) 83; non P. Br. Nat. Hist. Jam. (1756) 335; nomen rejic.—T.: *A. arens* Sw. 4421, partim. **Pterococcus** Hasskarl in Flora, XXV. pars 2 (1842), Suppl. 41; non Pallas, Reise, I. (1776) App. 738; II. (1777) App. 43.—T.: *P. glaberrimus* Hassk. (*P. corniculatus* (Sm.) Pax et K. Hoffm.).

*Ryssopterys* Blume ex Adr. Juss. in Deless. Ic. III. (1837) 21, t. 35.  
*Banisteria* L. Sp. Pl. ed. 1 (1753), 427; Gen. Pl. ed. 5 (1754), 195.

*Elsota* Adans. Fam. Pl. II. (1763) 358.

*Ricinella* Muell.-Arg. in Linnaea, XXXIV. (1863) 153.

*Durandeldlea* Kuntze, Rev. Gen. II. (1891) 603.

*Ceratococcus* Meissn. Gen. II. (1843) 369.

*Sagorinum* Endl. Gen., Suppl. III. (1843) 98.



## NOMINA CONSERVANDA

## EUPHORBACEAE

4435. *Micrandra* Benth. in Hook. Kew. Journ. Bot. VI. (1854) 371; non R. Br. in Bennett, Pl. Jav. Kar. (1844) 237.—T.: *M. siphonoides* Benth.
4452. *Sagotia* Baill. in Adansonnia, I. (1860-61) 53; non Walp. in Linnaea, XXIII. (1850) 737.—T.: *S. racemosa* Baill.
4467. *Chaetocarpus* Thwaites in Hook. Journ. Bot. and Kew Gard. Misc. VI. (1854) 300, t. 10A; non Schreb. in L. Gen. Pl. ed. 8 (1789), 75, nomen superfl.—T.: *C. castanocarpus* (Roxb.) Thwaites (*Adelia castanocarpa*).
4516. *Botryophora* Hook. f. Fl. Brit. Ind. V. (1888) 476; non Bompard in Hedwigia (1867), 129; nec J. C. Ag. in Lunds Univ. Aarskr. XXIII. (1887) 139.—T.: *B. Kingii* Hook. f.

## LIMNANTHACEAE

4542. *Limnanthes* R. Br. in London and Edinb. Philos. Mag. II. (1833) 70; non Stokes, Bot. Mat. Med. I. (1812) 300; nec *Limnanthus* Neck. Elem. II. (1790) 27.—T.: *L. Douglasii* R. Br.

## CELASTRACEAE

4623. *Denhamia* Meissn. Gen. 18, Comm. 16 (1837).—T.: *D. obscura* (A. Rich.) Meissn.
4627. *Gymnosporia* (Wight et Arn.) Hook f. in Benth. et Hook. f. Gen. Pl. I. (1862) 365.—T.: *G. montana* (Roxb.) Benth. (*Celastrus montanus*).

## NOMINA REJICIENDA

*Pogonophyllum* Didrichs. in Kjoebenhavn Vid. Meddel. (1857) 144.

*Regnaldia* Baill. in Adansonnia, I. (1861) 187.

*Leucocarpum* A. Rich. Sert. Astrolab. (1834) 46, t. 18.

[*Burglaria* Wendl. ex Steud. Nomencl. Bot. (1821) 129, nomen nudum.]

*Scytrophyllum* Eckl. et Zeyh. Enum. Pl. (1835) 124.

*Encentrus* C. Presl in Abhandl. Böhm. Ges. Wiss., Ser. 5, III. (1844) 463.

*Polyacanthus* C. Presl, loc. cit.

4637. **Plenckia** Reiss. in Mart. Fl. Bras. XI. pars 1 (1801), 30 ; non Rafin. Specchio Sc. I. (1814) 194 ; nec Moc. et Sessé ex DC. Prodr. I. (1824) 724, nomen nudum.—T. : *P. populnea* Reiss.

#### ICACINACEAE

4693. **Mappia** Jacq. Hort. Schoenbrunn. I. (1797) 22, t. 47 ; non Heist. ex Adans. Fam. Pl. II. (1763) 193 ; nec Schreb. Gen. II. (1791) 806.—T. : *M. racemosa* Jacq.

4715. **Stachyanthus** Engl. in Engl. et Prantl, Pflanzenfam., Nachtr. 1 (1897), 227 ; non DC. Prodr. V. (1836), 84.—T. : *S. Zenkeri* Engl.

#### SAPINDACEAE

4730. **Bridgesia** Bert. apud Cambess. in Nouv. Ann. Mus. Paris, III. (1834) 234, t. 13 ; non Hook. in Hook. Bot. Misc. II. (1831) 222, t. 92 ; nec Hook. et Arn. in Hook. Bot. Misc. III. (1833) 168, t. 102.—T. : *B. incisifolia* Bert.

4733. **Thouinia** Poit. in Ann. Mus. Paris, III. (1804) 70, t. 6 ; non L. f. Suppl. (1781) 9, 89, nomen rejic. ; nec Sm. Icon. Ined. I. (1789) t. 7.—T. : *T. simplicifolia* Poit.

4747. **Zollingeria** S. Kurz in Journ. As. Soc. Beng. XLI. (1872) 303 ; non Sch.-Bip. in Flora, XXXVII. (1854) 273.—T. : *Z. macrocarpa* S. Kurz.

4753. **Pancovia** Willd. Sp. Pl. II. (1799) 285 ; non Heist. ex Adans. Fam. Pl. II. (1763) 294.—T. : *P. bijuga* Willd.

4820. **Mischocarpus** Blume, Bijdr. (1825) 238.—T. : *M. sundaricus* Blume.

#### RHAMNACEAE

4899. **Colletia** Comm. ex Juss. Gen. (1789) 380 ; non Scop. Introd. Hist. Nat. (1777) 207.—T. : *C. spinosa* Lam.

*Tripterocarpus* Meissn. Gen. I. (1837) 52 ; II. (1836–43) 37.

*Thyana* Ham. Prodr. Pl. Ind. Occ. (1825) 36.

*Vargasia* Bert. ex Spreng. Syst. II. (1825) 283.

[*Belingia* Pierre, Fl. For. Cochinch. (1895), sub t. 325, in syn.]

*Pedicellia* Lour. Fl. Cochinch. (1790) 655.

## NOMINA CONSERVANDA

## VITACEAE

4910. **Ampelocissus** Planch. in DC. Monogr. V. pars 2 (1887), 368.—T.: *A. latifolius* (Roxb.) Planch.  
4918, partim. **Cayratia** Juss. in Dict. Sc. Nat. X. (1818) 103, in obs.—T.: *C. pedata* (Lam.) Gagnep.

## ELAEOCARPACEAE

4927. **Aristotelia** L'Hérit. Stirp. Nov. (1784) 31, t. 16; non *Aristotela* Adans. Fam. Pl. II. (1763) 125.—T.: *A. Magui* L.

## TILIACEAE

4948. **Ancistrocarpus** Oliv. in Journ. Linn. Soc. IX. (1867) 173; non H.B.K. Nov. Gen. et Spec. II. (1817) 186.—T.: *A. brevispinosus* Oliv.  
4957. **Sparrmannia** L. f. Suppl. Pl. (1781) 41, 265, 468; non *Sparrmannia* Buc'hoz, Pl. Nouvellem. Découv. (1779) t. 1, p. 3, nomen rejic.—T.: *S. africana* L. f.  
4959. **Luehea** Willd. in Neue Schr. Ges. Nat. Freunde Berlin, III. (1801) 410, t. 5; non F. W. Schmidt, Neue u. Selt. Pl. (1793) 23, et in Usteri, Ann. VI. (1793) 118.—T.: *L. speciosa* Willd.  
4960. **Mollia** Mart. Nov. Gen. et Sp. I. (1824) 96; non J. F. Gmel. Syst. II. (1791) 420; nec Willd. Hort. Berol. (1806) 11, t. 11.—T.: *M. speciosa* Mart.

## TRIPLOCHITONACEAE (nunc STERCULIACEAE)

- 5022A. **Triplochiton** K. Schum. in Engl. Bot. Jahrb. XXVIII. (1900) 330; non Alef. in Oesterr. Bot. Zeitschr. XIII. (1863) 13.—T.: *T. scleroxylon* K. Schum.

## BOMBACACEAE

5035. **Bernoullia** Oliv. in Hook. Ic. Pl. XII. (1873) t. 1169; non Neck. Elem. II. (1790) 97.—T.: *B. flammea* Oliv.

## NOMINA REJICIENDA

- Botria* Lour. Fl. Cochinch. (1790) 153.  
*Columella* Lour. Fl. Cochinch. (1790) 85.  
*Lagenula* Lour. Ic. 86.

[*Friesia* DC. in DC. Prodr. I. (1824) 520; non Spreng. Anteil. II. pars 2 (1818), 885.]

*Acrosepalum* Pierre in Bull. Soc. Linn. Paris, n.s. no. 1 (1898-99), p. 22, et no. 14, p. 119.

*Vossianthus* Kuntze in Gaertnerisch. Centr. Bl. 653 (1900), et in Post et Kuntze, Lexic. (1903) 590.

*Alegria* Moc. et Sessé ex DC. Prodr. I. (1824) 516.

*Schlechtendalia* Spreng. Syst. IV. Cur. Post. (1827) 295; non Willd. (1804).

5036. †*Cumingia* Vidal, Phan. Cuming. Philipp. 211 (1885); non *Cunningia* D. Don apud Sweet, Brit. Fl. Gard. III. (1828) sub t.257.—T.: *C. philippinensis* Vidal.

5040. *Neesia* Blume in Nova Acta Acad. Nat. Cur. XVII. pars I (1835), 83; non Spreng. Anleit. ed. 2, II. (1818) 547.—T.: *N. altissima* Blume.

#### STERCULIACEAE

5060. *Rulingia* R. Br. in Bot. Mag. (1820) t.2191; non *Ruelingia* Ehrh. Beitr. III. (1786) 132, nomen rejic.; nec *Rulugia* Harv. Syn. (1812) 124.—T.: *R. pinnosa* R. Br.

5062. *Byttneria* Loefl. It. Hisp. (1758) 313; non *Butneria* Duham. Arb. I. (1755) 113, t.45.—T.: *B. scabra* Loefl.

5075. *Seringia* J. Gay in Mém. Mus. Hist. Nat. Paris, VII. (1821) 442, tt.16, 17; non Spreng. Anleit. ed. 2, II. (1818) 694.—T.: *S. platyphylla* J. Gay=S. *arborescens* (Ait.) Druce.

#### THEACEAE

5144. *Bonnetia* Mart. et Zucc. Nov. Gen. et Sp. I. (1824) 114; non Schreb. Gen. (1789) 363; nec Neck. Elem. I. (1790) 368.—T.: *B. anceps* Mart. et Zucc.

5149. *Laplacea* H.B.K. Nov. Gen. et Sp. V. (1822) 307, t.461.—T.: *L. spectiosa* H.B.K.

5155. *Anneslea* Wall. Pl. As. Kar. I. (1829) 5; non *Annesia* Hook. in Salisb. Parad. Lond. (1807) t.64; nec *Anneslea* Roxb. apud Andr. Bot. Rep. X. (1810) t.618.—T.: *A. fragrans* Wall.

*Esenbeckia* Blume Bijdr. (1825) 118; non H.B.K. (1825).

[*Blumea* Reichb. Consp. (1828) 209; non Nees (1823); nec DC. (1833).]

*Cotylephora* Meissn. Gen. Comm. (1837) 28.

*Achilleopsis* Turcz. in Bull. Soc. Nat. Mosc. XXII. pars 2 (1849), 9.

*Chaetaea* Jacq. Enum. (1760) 17.

[*Gaya* Spreng. Syst. I. (1825) 535; non H.B.K. (1822).]

*Actinostigma* Turcz. in Bull. Soc. Nat. Mosc. XXXII. pars I (1859), 259 [non Welw. (1858) sine descr.].

*Kieseria* Nees in Wied-Neuwied, Reise Brasil. II. (1821) 338.

[*Haenocharis* Salisb. Parad. Lond. I. (1806) sub t. 56, sine descr.]

*Lindleya* Nees in Flora, I. (1821) 299, 328.

*Callosmia* C. Presl in Abh. Boehm. Ges. Wiss., Ser. 5, III. (1844) 533 (Bot. Bemerk. 103).

## NOMINA CONSERVANDA

## THEACEAE

5155. *Anneslea*, *continued*.

5157, partim. *Cleyera* Thunb. Nov. Gen. (1783) 68, partim ; emend. Sieb. et Zucc. Fl. Jap. I. (1835) 151.—T. : *C. japonica* Thunb. partim ; emend. Sieb. et Zucc. l.c. 153, t. 81.

5157, partim. *Freziera* Swartz, Fl. Ind. Occ. (1800) 971, partim ; emend. Choisy in Mém. Soc. Phys. Genève, XIV. (1855) 122 ; Benth. et Hook. f. Gen. Pl. I. (1862) 183.—T. : *F. undulata* Swartz.

## GUTTIFERAE

5195. *Balboa* Planch. et Triana in Ann. Sc. Nat., Sér. 4, XIV. (1880) 252 ; non Liebm. in Kjöeb. Vidensk. Meddel. (1853) 106.—T. : *B. membranacea* Planch. et Triana.

5205. *Platonia* Mart. Nov. Gen. et Sp. III. (1829) 168, t. 289 ; non Rafin. in Med. Repos. N. York, V. (1808) 352 ; nec Kunth, Rev. Gram. I. (1829) 139, 327, t. 76.—T. : *P. insignis* Mart.

## DIPTEROCARPACEAE

5221. *Pierrea* Heim in Bull. Soc. Linn. Paris (1891), 938 ; Recherch. Diptérocarp. (1892) 78 ; non Hance in Journ. Bot. XV. (1877) 339.—T. : *P. pachycarpa* Heim.

## FLACOURTIACEAE

5311. † *Byrsanthus* Guillem. in Deless. Ic. Sel. III. (1837) 30, t. 52 ; non *Byrsanthus* C. Presl, Prodr. Monogr. Lobel. (1836) 41.—T. : *B. Brownii* Guillem.

## NOMINA REJICIENDA

*Daydonia* Britten in Journ. Bot. XXVI. (1888) 11.

*Mounthuorisia* Szysz. in Engl. et Prantl, Nat. Pflanzenfam. III. pars 6 (1893), 189.

*Eroleum* Swartz, Prodr. (1788) 85, partim.

*Eroleum* Swartz, Prodr. (1788) 85, partim.

*Lettissomia* Ruiz et Pav. Prodr. (1794), 77, t. 14.

*Aneha* Endl. Gen. (1839) 923.

5334. *Lunania* Hook. in Hook. Lond. Journ. Bot. III. (1844) 317; non Rafin. Medic. Flora, II. (1830) 106.—T.: *L. racemosa* Hook.  
 5353. *Tetralix* Griseb. Cat. Pl. Cub. (1866) 8; non Hill, Veg. Syst. IV. (1762) 18; nec [Haller] Zinn, Cat. (1757) 202.—T.: *T. brachypetalus* Griseb.

#### LOASACEAE

5392. *Blumenbachia* Schrad. in Goetting. Gel. Anz. (1825) 1705; non Koeler, Gram. Gall. Germ. (1802) 28.—T.: *B. insignis* Schrad.

#### ANCISTROCLADACEAE

5400. *Ancistrocladus* Wall. Cat. (1829) n. 1052, nomen; Wight et Arn. Prodr. I. (1834), 107, in obs.; Planch. in Ann. Sc. Nat., Sér. 3, XIII. (1850) 317.—T.: *A. hamatus* (Vahl) Gilg.

#### OLINIACEAE

5428. *Olinia* Thunb. in Roem. Arch. II. (1799) 4.—T.: *O. cynosa* Thunb.

#### THYMELAEACEAE

5457. *Ovidia* Meissn. in DC. Prodr. XIV. (1857) 524; non Rafin. Fl. Tellur. III. (1836) 68.—T.: *O. Pillo-Pillo* (Gay) Meissn. ex Domke.  
 ———. *Synandrodaphne* Gilg in Engl. Jahrb. LIII. (1915) 362; non Meissn. in DC. Prodr. XV. pars 1 (1864), 176.—T.: *S. paradoxa* Gilg.

#### COMBRETACEAE

5538. *Combretum* L. in Loeffl. Iter. Hisp. (1758) 308; L. Syst. ed. 10 (1759), 999.—T.: *C. fruticosum* (Loeffl.) Fawcett et Rendle.

*Bembix* Lour. Fl. Cochinch. (1790) 282.

*Wormia* Vahl in Skrift. Nat. Selsk. Kjøeb. VI. (1810) 104; non Rottb. (1783).

*Bigamea* König ex Endl. Gen. (1840) 1183.

*Plectronia* L. Mant. I. (1767) 6, 52, excl. fruct. et syn.

*Grislea* L. Sp. Pl. ed. 1 (1753), 348,

# NOMINA CONSERVANDA

## MYRTACEAE

5585. **Ptilocalyx** Brongn. et Gris in Bull. Soc. Bot. France, XII. (1865) 185 ; et in Ann. Sc. Nat., Sér. 5, III. (1865) 225 ; non *Ptilocalyx* Gasparry in Rendic. Accad. Sc. Napoli, VI. (1847) 409 ; et in Ann. Sc. Nat., Sér. 3, IX. (1848) 221.—T. : *P. robustus* Brongn. et Gris.

## MELASTOMATACEAE

5632. **Pterolepis** Miq. Comm. Phytogr. (1839) 72 ; non Schrad. in Goett. Gel. Anzeig. (1821) 2071, nom. rejic.—T. : *Osbeckia parnassifolia* DC. = *Pterolepis parnassifolia* (DC.) Triana.

5648. **Microlepis** (DC.) Miq. Comm. Phytogr. fasc. II. (1839) 71 ; non Eichwald, Casp. Cauc. (1831) 2.—T. : *Osbeckia oleifolia* DC. = *Microlepis oleifolia* (DC) Triana.

5669. **Cambessedesia** DC. in DC. Prodr. III. (1828) 110 ; non *Cambessedea* Kunth in Ann. Sc. Nat. III. (1824) 336.—T. : *C. Hilariana* (Kunth) DC. (*Rhexia Hilariana*).

5676. **Rhynchanthera** DC. in DC. Prodr. III. (1828) 106 ; non Blume, Tabell. Jav. Orch. (1825) 78.—T. : *R. grandiflora* (Aubl.) DC.

5692. **Meriania** Swartz, Fl. Ind. Occ. II. (1800) 823, t. 15 ; non Trew, Pl. Select. Pinx. Ehret (1754), II, t. 40, nom. rejic.—T. : *M. leucantha* Swartz.

5708. **Bertolonion** Raddi in Mem. Soc. Ital. Sc. XVIII. (1820) 384, t. 5, fig. 3 ; non Spin. Cat. Jard. St. Sebast. (1809) 24.—T. : *B. nymphaeifolia* Raddi.

5768. **Bellucia** Neck. Elem. II. (1790) 142 ; non *Bellucia* Adans. Fam. Pl. II. (1763) 344.—T. : *B. grossularioides* (L.) Triana.

# NOMINA REJICIENDA

*Brachyandra* Naud. in Ann. Sc. Nat., Sér. 3, II. (1844) 143.

*Ancistrodesmus* Naud. in Ann. Sc. Nat., Sér. 3, XIII. (1849) 302.

*Actipetalum* Turcz. in Bull. Soc. Nat. Mosc. XXI. pars 1 (1848), 577, partim.

*Davya* DC. in DC. Prodr. III. (1825) 108.

*Triblema* R. Br. apud Spreng. Gen. I. (1830) 342.

*Apatitia* Desv. in Hamilt. Fl. Ind. Occ. (1825) 42.

# UMBELLIFERAE

5938. **Anthriscus** [Pers. Syn. I. (1805), 320, partim] Hoffm. Umbellif. I. (1814) 38; non Bernh. Syst. Verz. Pf. Erfurt, 113 (1800).—T.: *A. vulgaris* Pers.=*A. Caulalis* Marsch. Bieb.

5964. **Scaligeria** DC. Mém. V. (1829) 70; non *Scaligeria* Adans. Fam. Pl. II. (1763) 323.—T.: *S. microcarpa* DC.

5977. **Tauschia** Schlecht. in Linnaea, IX. (1835) 607; non Preissler in Flora, XI. (1828) 44.—T.: *T. nudicaulis* Schlecht.

5990. **Lichtensteinia** Cham. et Schlecht. in Linnaea, I. (1826) 394; non Willd. in Mag. Ges. Nat. Fr. Berlin, II. (1808) 19; nec Wendl. Coll. Pl. II. (1808) 4.—T.: *L. lacera* Cham. et Schlecht.

6014. **Trachyspermum** Link, Enum. I. (1821) 267.—T.: *T. Ammi* (L.) Sprague (*T. copticum* Link).

6045. **Polemannia** Eckl. et Zeyh. Enum. (1837) 347; non Berg. ex Schlecht. in Linnaea, I. (1826) 250.—T.: *P. grossulariifolia* Eckl. et Zeyh.

6058. **Schulzia** Spreng. Pl. Umbellif. Prodr. (1813) 30; non *Schultzia* Rafin. in Med. Repos. N. York, V. (1808) 350.—T.: *S. crinita* (Pall.) Spreng. (*Sison crinitus*).

6099. **Bonannia** Guss. Fl. Sicul. Syn. I. (1842) 355; non Rafin. Specchio, I. (1814) 115; nec C. Presl, Fl. Sicul. I. (1826) 99.—T.: *B. resinifera* (Guss.) Guss.=*B. graeca* (L.) Halácsy.

# ERICACEAE

6200. **Lyonia** Nutt. Gen. I. (1818) 266; non Rafin. in Med. Repos. N. York, V. (1808) 353; nec Ell. Sketch Bot. S. Carol. I. (1817) 316.—T.: *L. ferruginea* Nutt.

*Chaerofolium* Haller, Hist. I. (1768) 327 [forsan lapsus pro "*Cerefolium*"].  
*Cerefolium* Haller, Hist. I. (1768) 328, et I.c. III. 193; Haller, Nomenclator (1769), 69.

*Elaeosticta* Fenzl in Flora, XXVI. (1843) 458.

*Ammios* Mocuch, Meth. (1794) 99.

*Xolisma* Rafin. in Am. Monthly Mag. IV. (1819) 193.



## NOMINA CONSERVANDA

## EPACRIDACEAE

6254. **Richea** R. Br. Prodr. (1810) 555 ; non Labill. Voy. I. (1798) 186, t. 16 ; nec *Richaëia* Petit-Thouars, Gen. Nov. Madag. (1806) 25 (corr. *Richea* Post et Kuntze, Lexic. 485 : 1903).—T. : *R. dracophylla* R. Br.

6262, partim. **Leucopogon** R. Br. Prodr. (1810) 541.—T. : *L. lanceolatus* (Sm.) R. Br.

## DIAPENSIACEAE

6275. **Shortia** Torr. et Gray in Am. Journ. Sc., Ser. 1, XLII. (1842) 48, et l.c. Ser. 2, XLV. (1868) 402 ; non Rafin. Autikon Botanikon (1840), 16 ; Pennell in Bull. Torr. Bot. Cl. XLVIII. (1921) 92.—T. : *S. galacifolia* Torr. et Gray.

6277. **Galax** L. Sp. Pl. ed. 1 (1753), 200, partim ; emend. Nutt. Gen. I. (1818) 145 ; non L. Gen. Pl. ed. 5 (1754), 93.—T. : *G. aphylla* L.

## PRIMULACEAE

6318. **Douglasia** Lindl. in Royal Institution of Great Britain, Quarterly Journ. Sc. Lit. and Arts, Oct. 1827, 385.—T. : *D. nivalis* Lindl.

6350. **Armeria** Willd. Enum. Pl. Hort. Berol. (1809) 333.—T. : *A. vulgaris* Willd.

## NOMINA REJICIENDA

*Cystanthe* R. Br. Prodr. (1810) 555.

*Perojoa* Cav. Ic. IV. (1797) 29, t. 349.

*Sherwoodia* House in Torreya, VII. (1908) 234.

*Erythrovhiza* Michx. Fl. Bor.-Am. II. (1803) 34, t. 36.

*Solenandria* Vent. Jard. Malm. (1803) t. 69.

*Blandfordia* Andr. Bot. Rep. (1804) t. 343.

*Solenandra* Pers. Syn. II. (1807) 215.

*Vitaliana* Sessl. in Donati, Auszug seiner Natur-Geschichte des Adriat. Meers, 66, t. [2] fig. X. A-I (1753) (cf. Journ. Bot. LXXII. 293 : 1934).

*Statice* L. Sp. Pl. ed. 1 (1753), 274, partim ; emend. Mill. Gard. Dict. Abridg. ed. 4 (1754).

6351. *Limonium* Mill. Gard. Dict. Abridg. ed. 4 (1754).—T.:  
*L. vulgare* Mill.

SAPOTACEAE

6365. *Labatia* Swartz, Prodr. Veg. Ind. Occ. (1788) 32; non  
Scop. Introd. (1777) 197.—T.: *L. sessiliflora* Swartz.

6382. *Niemeyera* F. Muell. Fragm. VII. (1870) 114; non F.  
Muell. Fragm. VI. (1867) 96.—T.: *N. prunifolia* F. Muell.

6384. *Cryptogyne* Hook. f. in Benth. et Hook. f. Gen. Pl.  
II. (1876) 656; non Cass. Dict. Sc. Nat. I. (1827) 491, 498.—T.:  
*C. Gerardiana* Hook. f.

EBENACEAE

6408. *Brachynema* Benth. in Trans. Linn. Soc. XXII. (1857)  
125, t. 22; non Griff. Notul. IV. (1854) 176.—T.: *B. ramiflorum*  
Benth.

OLEACEAE

6422. *Schrebera* Roxb. Pl. Coromand. II. (1798) 1, t. 101;  
non L. Sp. Pl. ed. 2 (1763), 1662, nomen confusum; nec Retz. Obs.  
Bot. VI. (1791) 25, t. 3; nec Thunb. Prodr. Pl. Cap. (1794) 28, t. 2.—  
T.: *S. swietenioides* Roxb.

LOGANIACEAE

6468. *Peltanthera* Benth. in Benth. et Hook. f. Gen. Pl. II.  
(1876) 797; non Roth, Nov. Sp. Pl. (1821) 132.—T.: *P. floribunda*  
Benth.

GENTIANACEAE

6501. *Bartonia* Mühlenb. ex Willd. in Neue Schrift. Ges.  
Naturf. Fr. Berlin, III. (1801) 444.—T.: *B. tenella* Mühlenb. ex Willd.

6526. *Schultesia* Mart. Nov. Gen. et Sp. II. (1827) 103, tt. 180-  
2; non Spreng. Pugill. II. (1815) 17; nec Schrad. in Gött. Gel. Anz. I.  
(1821) 708; nec Roth, Enum. Pl. Phanerog. Germ. I. (1827) 690.—  
T.: *S. crenuliflora* Mart.

*Statice* L. Sp. Pl. ed. 1 (1753), 274,  
partim; emend. Willd. Enum. Pl. Hort.  
Berol. (1809) 335.

*Nathusia* Hochst. in Flora, XXIV.  
pars 2 (1841), 671.

*Agina* Neck. Elem. II. (1790) 153.

*Floyeria* Neck. Elem. I. (1790) 388.

## NOMINA CONSERVANDA

## APOCYNACEAE

6564. *Willughbeia* Roxb. Pl. Coromandel, III. (1819) 77, t. 280; non Scop. in Schreb. Gen. I. (1789) 162; nec *Willughbaeya* Neck. Elem. I. (1790) 82, nomen rejic.—T.: *W. edulis* Roxb.

6583. *Alstonia* R. Br. in Mem. Werner. Soc. I. (1809) 75; non Scop. Introd. (1777) 198; nec Mutis apud L. f. Suppl. (1781) 39.—T.: *A. scholaris* (L.) R. Br. (*Echites scholaris*).

6639. *Urceola* Roxb. in Asiat. Research. V. (1798) 169; non Vand. Fl. Lusit. et Bras. Sp. (1788) 8, t. 1, fig. 4; Roem. et Schult. Syst. III. (1818) 99; nec Quelet, Ench. Fung. (1886) 320.—T.: *U. elastica* Roxb.

6670. *Spirolobium* Baill. in Bull. Soc. Linn. Paris (1889), 773; non Orb. Voy. Amér. Merid. VII. pars 1, Sert. Patag. (1839) t. 13.—T.: *S. cambodianum* Baill.

6691. *Parsonsia* R. Br. in Mem. Werner. Soc. I. (1809) 64; non P. Br. Nat. Hist. Jam. (1756) 199.—T.: *Periploca capsularis* Forst.

6702. *Prestonia* R. Br. in Mem. Werner. Soc. I. (1809) 69; non Scop. Introd. (1777) 281.—T.: *P. tomentosa* R. Br.

## ASCLEPIADACEAE

6726. *Camptocarpus* Decne. in DC. Prodr. VIII. (1844) 493; non Koch in Linnaea, XVII. (1843) 304.—T.: *C. mauritiana* (Poir.) Decne. (*Periploca mauritiana*).

6772. *Schubertia* Mart. et Zucc. Nov. Gen. et Sp. Pl. I. (1824) 55, t. 33; non Mirbel in Nouv. Bull. Soc. Philom. III. (1812) 123.—T.: *S. multiflora* Mart. et Zucc.

## NOMINA REJICIENDA

*Ancylodactylus* [Wall. Pl. As. Rar. III. (1832) 45, nomen provisorium;] Kuntze, Rev. Gen. II. (1891) 412; Pierre in Bull. Soc. Linn. Par. n. s. I. (1898-1899) 94.

*Pala* Juss. in Ann. Mus. Paris, XV (1810) 346.

*Chavannesia* A. DC. in DC. Prodr. VIII. (1844) 444.

*Helygia* Blume, Bijdr. XVI. (1826) 1043.

*Exoanthemon* G. Don, Gen. Syst. IV. (1838) 82.

*Haemadicylon* Lindl. in Trans. Hort. Soc. VI. (1825) 70.

6889. **Pectinaria** Haw. Suppl. Pl. Succul. (1819) 14; non Bernh. Syst. Verz. Pfl. Erfurt (1800), 113.—T.: *P. articulata* Haw.

#### CONVOLVULACEAE

6979, partim. **Bonamia** Thouars in Dict. Sc. Nat. V. (1804) 145; Hist. Vég. Isl. Afr. (1805) 17, t. 8; non *Bouanyma* Neck. Elem. I. (1790) 316.—T.: *B. madagascariensis* Poir.

#### HYDROPHYLLACEAE

7022. **Nemophila** Nutt. in Barton, Fl. N. Am. II. (1822) 71.—T.: *N. phacelioides* Nutt.

7033. **Nama** L. Syst. ed. 10 (1759), 950, partim, emend. Choisy in DC. Prodr. X. (1846) 182; non L. Sp. Pl. ed. 1 (1753), 226.—T.: *N. jamaicensis* L.

7035. **Wigandia** H.B.K. Nov. Gen. et Sp. III. (1818) 126; non Neck. Elem. I. (1790) 95.—T.: *W. caracasana* H.B.K.

#### BORAGINACEAE

7042. **Bourreria** P. Br. Nat. Hist. Jam. (1756) 168; Jacq. Enum. Pl. Carib. II. (1760) 14; non *Beureria* Ehret, Pl. et Papil. Rar. (1755) t. 13.—T.: *B. succulenta* Jacq. (*Cordia Bourreria* L.)

7124. **Rochelia** Reichb. in Flora, VII. (1834) 243; non Roem. et Schult. Syst. IV. pars II (1819), 108.—T.: *R. saccharata* Reichb. = *R. dispersa* (L.) Wettst.

—, † **Vaupellia** Brand in Fedde, Repert. XIII. (1914) 82; non *Vaupellia* Griseb. Fl. Brit. W. Ind. (1861) 460.—T.: *V. barbata* (Vaupel) Brand.

*Galax* L. Sp. Pl. ed. 1 (1753), 200, partim; Gen. Pl. ed. 5 (1754), 93.

*Viticella* Mitchell, Diss. Brevis Bot. et Zool. (1769) 42.

*Conanthus* S. Wats. Bot. King's Exped. (1871) 256.

*Marilaunidium* Kuntze, Rev. Gen. II. (1891) 434.

*Cohiba* Rafin. Fl. Tellur. III. (1836) 75.

*Morelosia* La Llave et Lex. Nov. Veg. Descr. I. (1824) 1.

*Raclathris* Rafin. Sylva Tellur. (1838) 167.

*Maccoya* F. Muell. Fragm. I. (1859) 127.

## NOMINA CONSERVANDA

## VERBENACEAE

7139. **Urbania** Philippi, Verz. Pfl. Antofagasta u. Tarap. (1891) 60; non Vathek in Oesterr. Bot. Zeitschr. XXV. (1875) 10.—T.: *U. pappigera* Philippi.

7157. **Casselia** Nees et Mart. in Nov. Act. Acad. Leop.-Carol. XI. (1823) 73, t. 6; non Dumort. Comm. Bot. (1822) 21.—T.: *C. serrata* Nees et Mart.

—, **Xerocarpa** H. J. Lam, Verbenac. Mal. Arch. (1919) 98; non Spach, Hist. Veg. Phan. IX. (1840) 583.—T.: *X. ancenninifoliola* H. J. Lam.

## LABIATAE

7227. **Stenogyne** Benth. in Bot. Reg. XV. (1830) sub t. 1292; non Cass. in Dict. Sc. Nat. L. (1827) 491, 493.—T.: *S. rugosa* Benth.

7306. **Saccocalyx** Coss. et Dur. in Ann. Sc. Nat., Sér. 3, XX. (1853) 80; non Stev. in Bull. Soc. Nat. Mosc. IV. (1832) 269.—T.: *S. satuireioides* Coss. et Dur.

7346. **Alvesia** Welw. in Trans. Linn. Soc. XXVII. (1869) 55; non Welw. Apont. (1859) 587, no. 47.—T.: *A. rosmarinifolia* Welw.

## SOLANACEAE

7392. **Triguera** Cav. Diss. II. (1786) App., p. 1, t. A.; non Cav. Diss. I. (1785) 41, t. 11.—T.: *T. ambrosiaca* Cav.

7414. **Solandra** Swartz in Vet. Akad. Handl. Stockh. VIII. (1787) 300, t. 11; non L. Syst. ed. 10 (1759), 1269; nec Murr. in Comm. Goett. 1783-4, VI. (1785) 21, t. 1.—T.: *S. grandiflora* Swartz.

## SCROPHULARIACEAE

7510. **Tetranema** Benth. in Bot. Reg. [XXIX.] (1843) t. 52; non Sweet, Hort. Brit. ed. 2 (1830), 149.—T.: *T. mexicanum* Benth.

## NOMINA REJICIENDA

[*Swartzia* J. F. Gmel. Syst. II. (1791) 360; non Schreb. (1791), nom. conserv.]

BIGNONIACEAE

7668. *Cuspidaria* DC. in Bibl. Univ. Genève, XVII. (1838) 125 (seors. 9); non Link, Handb. Gewächse, II. (1831) 315.—T.: *C. pterocarpa* (Cham.) DC. (*Bignonia pterocarpa*).

7673. *Haplophium* Cham. corr. Endl. Gen. (1839) 712.—T.: *H. bracteatum* Cham.

7697. *Lundia* DC. in Bibl. Univ. Genève, XVII. (1838) 127; et in Ann. Sc. Nat., Sér. 2, Bot. XI. (1839) 289; non Schum. et Thonn. Beskr. Guineiske Pl. II. (1828) 5.—T.: *L. glabra* DC.

GESNERIACEAE

7808. *Oreocharis* Benth. in Benth. et Hook. f. Gen. Pl. II. (1876) 1021; non "Decaisne" Lindl. Veg. Kingd. ed. 1 (1846), 656.—T.: *Didymocarpus Oreocharis* Hance=*Oreocharis Benthiana* C. B. Clarke.

7824. *Aeschynanthus* Jack in Trans. Linn. Soc. XIV. (1823) 42, t.2, fig. 3.—T.: *A. volubilis* Jack.

7835. *Acanthonema* Hook. f. in Bot. Mag. LXXXVIII. (1862) t.5339; non J. G. Agardh in Svensk. Vet. Akad. Handl. (1846) 13.—T.: *A. strigosum* Hook. f.

7853. *Mitraria* Cav. in Ann. Cienc. Nat. III. (1801) 230, t.31; non J. F. Gmel. Syst. II. (1791) 799.—T.: *M. coccinea* Cav.

7866. †*Codonanthe* (Mart.) Hanst. in Linnaea, XXVI. (1854) 209; non *Codonanthus* G. Don, Gen. Syst. IV. (1837) 166, genus dubium; nec *Codonanthus* Hassk. in Flora, XXV. Beibl. II. (1842) 24, nomen nudum.—T.: *C. aggregata* (Mart.) Hanst. (*Hypocyrta aggregata*).

7878. †*Seemannia* Regel in Gartenfl. IV. (1855) 1183, t.126 [non Hook. Lond. Journ. Bot. VII. (1848) 567, nomen provisorium.]—T.: *S. ternifolia* Regel=S. *sylvatica* (H.B.K.) Hanst.

*Nouletia* Endl. Gen. (1841) 1407.  
[*Lochinocydia* Mart. ex DC. in DC. Prodr. IX. (1845) 177, pro. syn.]  
*Aplolophium* Cham. in Linnaea, VII. (1832) 556.

*Craterotecomia* Mart. ex DC. in DC. Prodr. IX. (1845) 215.

*Trichosporum* D. Don in Edinb. Phil. Journ. VII. (1822) 84.

*Diplocalyx* C. Presl, Bot. Bemerk. (1844) 146.

*Coccanthera* C. Koch ex Hanst. in Ind. Sem. Hort. Berol. (1855) 17.

*Fritschiantha* Kuntze, Rev. Gen. III. pars 2 (1898), 241.

## NOMINA CONSERVANDA

## ACANTHACEAE

7914. **Thunbergia** Retz. in Phys. Saellsk. Handl. I. (1776) 163 ; non Montin in Vet. Akad. Handl. Stockholm (1773), 288, t. 11. — T. : *T. capensis* Retz.

7972. **Crabbea** Harv. in Hook. Lond. Journ. Bot. I. (1842) 26 ; non Harv. Gen. S. Afr. Pl. (1838) 276. — T. : *C. hirsuta* Harv.

8028. **Tetramerium** Nees in Benth. Bot. Voy. Sulphur (1844), 147, t. 48 ; non Gaertn. f. Fruct. III. (1805) 90, t. 196. — T. : *T. polystachyum* Nees.

8039. **Mackaya** Harv. Thes. Cap. I. (1859) 8, t. 13 ; non Arn. in Mag. Zool. and Bot. II. (1838) 550. — T. : *M. bella* Harv.

8100. **Trichocalyx** I. B. Balf. in Proc. Roy. Soc. Edinb. XII. (1884) 87 ; non Schau. in Nov. Act. Acad. Nat. Cur. XIX. Suppl. II. (1841) 238, nomen superfl. — T. : *T. obovatus* I. B. Balf.

## RUBIACEAE

8130. **Lerchea** L. Mant. II. (1771) 155 ; non *Lerchia* Zinn, Catal. Pl. Goett. (1757) 30. — T. : *L. longicauda* L.

8158. **Cruckshanksia** Hook. et Arn. in Hook. Bot. Misc. III. (1833) 361 ; non Hook. et Arn. l.c. II. (1831) 211, t. 90. — T. : *C. hymenodon* Hook. et Arn.

8162. **Payera** Baill. in Bull. Soc. Linn. Paris, I. (1878) 178 ; non *Payeria* Baill. in Adansonia, I. (1860–61) 50, t. 3. — T. : *P. conspicua* Baill.

8181. **Wendlandia** Bartl. Ordin. (1830) 211 ; et ex DC. Prodr. IV. (1830) 411 ; non Willd. Sp. Pl. II. (1799) 275, nomen rejic. — T. : *W. paniculata* DC.

## NOMINA REJICIENDA

*Flemingia* Roxb. ex Rottl. in Neue Schrift. Ges. Naturf. Fr. IV. (1803) 202 ; non Roxb. ex Ait. (1812).

*Diplocalymma* Spreng. Neue Entdeck. III. (1822) 30.

*Henrya* Nees in Benth. Bot. Voy. Sulphur (1844), 148, t. 49.

*Codaria* L. ex Benn. Pl. Jav. Rar. (1838) 99 ; Kuntze, Rev. Gen. I. (1891) 279.

*Rotheria* Meyen, Reise, I. (1834) 402.

8183. **Augusta** Pohl in Flora, XII. (Feb. 1829) 118; non Leandro in Denkschr. Akad. Muench. VII. (1819) 235, nomen rejic.; nec *Augustia* Klotzsch in Monatsb. Berlin Akad. (Martio 1854) 124; Abh. Akad. Berlin (1854) 80.—T.: *A. lanceolata* Pohl = *A. longifolia* (Spreng.) Rehder (*Ucrania longifolia*).

8215. **Schizocalyx** Wedd. in Ann. Sc. Nat., Sér. 4, I. (1854) 73; non Scheele in Flora, XX. pars 1 (1843) 575; nec Hochst. in Flora, XXVII. Beil. I. (1844).—T.: *S. bracteosa* Wedd.

8244. **Coptophyllum** Korth. in Ned. Kruidl. Arch. II. (1851) 161; non Gardn. in Hook. Lond. Journ. Bot. I. (1842) 133.—T.: *C. bracteatum* Korth.

8265. **Pentagonia** Benth. Bot. Voy. Sulphur (1844), 105; non Heist. ex Fabricius, Enum. Pl. Helmstad. (1759) 184, nom. rejic.; nec *Pentagonium* Schau. in Nova Acta Nat. Cur. XIX. Suppl. I (1843), 364.—T.: *P. macrophylla* Benth.

8285. **Gardenia** Ellis in Phil. Trans. LI. (1761) 935, t. 23, Soland. l.c. LII. (1762) 654, t. 20; Phil. Trans. Abridg. XI. (1809) 508, 669, t. 15, fig. A-E; non Colden, Essays Edinb. II. (1756) 1; Boehm. in Ludw. Def. ed. 3 (1760), 292.—T.: *G. jasminoides* Ellis.

8296. **Villaria** Rolfe in Journ. Linn. Soc., Bot. XXI. (1884) 311; non Schreb. Gen. II. (1791) 685; nec Batty, Notice Hist. sur Villar (1858), cf. Bull. Soc. Bot. France, V. (1858) 309; nec *Vilaria* Guett. Mém. Minéral Dauphiné, I. Préf. p. clxx. et II. (1779) t. 19; nec *Villaria* Guett. ex DC. Prodr. VI. (1837) 542, pro syn.—T.: *V. philippinensis* Rolfe.

8312. **Zuccarinia** Blume, Bijdr. (1826) 1006; non Maerklin in Ann. Ges. Wetterau, II. (1811) 252; nec Spreng. Syst. IV. Cur. Post. (1827) 50; Spreng. Gen. I. (1830) 169.—T.: *Z. macrophylla* Blume.

8353. **Mesoptera** Hook. f. in Benth. et Hook. f. Gen. Pl. II. (1873) 130; non Rafn. Fl. Tellur. IV. (1836) 49.—T.: *M. Mangayi* Hook. f.

[*Ucrania* Spreng. Syst. I. (1825) 516, 761, partim; non Willd. Sp. Pl. I. (1797) 961.]

*Schreibersia* Pohl in Endl. Gen. (1838) 553.

*Watsonianra* Kuntze, Rev. Gen. I. (1891) 302.

*Warneria* L. Amoen. Acad. IV. (1759) 138.

*Varneria* L. l.c. 136.



## NOMINA CONSERVANDA

## RUBIACEAE

8357. **Cuviera** DC. in Ann. Mus. Paris, IX. (1807) 222, t. 15; non Koeler, Descr. Gram. Gall. et Germ. (1802) 328.—T.: *C. acutiflora* DC.

8388. **Psilanthus** Hook. f. in Hook. Ic. Pl. (1873) t. 1129; non Juss. in Ann. Mus. Paris, IV. (1805) 396, nomen; nec Roem. Syn. Pepon. (1846) 198; nec *Psilosanthus* Neck. Elem. I. (1790) 69, nom. rejic.—T.: *P. Mannii* Hook. f.

8397. **Trichostachys** Hook. f. in Benth. et Hook. f. Gen. Pl. II. (1873) 128; non Welw. Synops. (1862) 19.—T.: *T. longifolia* Hiern.

8412. **Lasianthus** Jack in Trans. Linn. Soc. XIV. (1823) 125; non Adans. Fam. Pl. II. (1763) 398.—T.: *L. cyanocarpus* Jack.

— **Robynsia** Hutchinson in Hutchinson et Dalziel, Fl. W. Trop. Afr. II. (1931) 108; non Drapiez in Lem. Hort. Univ. II. (1841) 127, 231; nec Mart. et Gal. in Bull. Acad. Brux. X. pars 2 (1843), 193.—T.: *R. glabrata* Hutch.

## DIPSACACEAE

8541. **Cephalaria** Schrad [Ind. Sem. Hort. Gotting. 1814, 2, sine descr.] ex Roem. et Schult. Syst. Veg. III. (1818) 1, 43.—T.: *C. alpina* (L.) Roem. et Schult.

## STYLIDIACEAE

8724. **Stylidium** Swartz in Willd. Sp. Pl. IV. (1805) 7, 146; et in Mag. Ges. Naturf. Fr. Berlin, I. (1807), 48, tt. 1, 2; et l.c. V. (1811) 89; non Lour. Fl. Cochinch. (1790) 220.—T.: *S. graminifolium* Swartz.

## NOMINA REJICIENDA

*Dasus* Lour. Fl. Cochinch. (1790) 141.

*Lepicephalus* Lag. Gen. et Sp. Nov. (1816) 7.

*Candollea* Labill. in Ann. Mus. Paris, VI. (1805) 453.

[*Ventenatia* Sm. Exot. Bot. II. (1806) 13, tt. 66, 67; non Cav. (1797); nec Koel. (1802), nom. utique conserv.]

*Forsteropsis* Sond. in Lehm. Pl. Preiss. I. (1845) 393.

COMPOSITAE

8761. **Piptolepis** Sch. Bip. in Pollichia, XX.-XXI. (1863) 380; non Benth. Pl. Hartweg. (1840) 29.—T.: *P. ericoides* Sch. Bip.
8772. **Soaresia** Sch. Bip. in Pollichia, XX.-XXI. (1863) 376; non Fr. Allem. in Rev. Bras. I. (1857) 210; et in Arch. Palestra Sc. Rio de Janeiro (1858), 142.—T.: *S. velutina* Sch. Bip.
8808. **Brachyandra** Philippi [in Bot. Zeit. XV. (1857) 681, nomen.]; Fl. Atac. (1860) 34, t. 4; non Naud. in Ann. Sc. Nat., Sér. 3, II. (1841) 143.—T.: *B. macrogyne* Philippi.
8840. **Bradburia** Torr. et Gray, Fl. N. Am. II. (1841) 250; non *Bradburia* Rafin. Fl. Ludovic. (1817) 104.—T.: *B. hirtella* Torr. et Gray.
8843. **Chiliophyllum** Philippi in Linnaea, XXXIII. (1864) 132; non DC. in DC. Prodr. V. (1836) 554.—T.: *C. densifolium* Phil.
8852. **Haplopappus** Cass. corr. Endl. Gen. (1837) 385.—T.: *H. glutinosus* Cass.
8855. **Bigelowia** DC. in DC. Prodr. V. (1836) 329; non Rafin. in Journ. Phys. Chim. Hist. Nat. LXXXIX. (1819) 289, sphalmate "*Bigelonia*"; nec *Bigelovia* Sm. in Rees, Cyclop. XXXIX. (1819); nec Spreng. Neue Entdeck. II. (1821) 150; nec Spreng. Syst. I. (1825) 366, 404; nec *Bigelovia* DC. ex Gingins in DC. Prodr. I. (1824) 290, pro syn.—T.: *B. nudata* (Michx.) DC.
8887. **Amellus** L. Syst. Nat. ed. 10, II. (1759) 1225; non P. Br. Nat. Hist. Jam. (1756) 317; T.: *A. lychnites* L.
8909. **Celmisia** Cass. [in Dict. Sc. Nat. XXXVII. (1825) 259, partim] ex DC. in DC. Prodr. V. (1836) 210; non Cass. in Bull. Soc. Philom. (1817) 32.—T.: *C. longifolia* Cass.
- Leto* Philippi in Ann. Mus. Nac. Chile (1891), 33.
- Mauchia* Kuntze, Rev. Gen. I. (1891) 352.
- Aplopappus* Cass. in Dict. Sc. Nat. LVI. (1826) 168.
- Hoorebeckia* Cornelissen in Mussch. Hort. Gand. (1817) 120.
- Chondrophora* Rafin. New Fl. N. Am. IV. (1836) 79.
- Haenelia* Walp. Repert. Bot. Syst. II. (1843) 974.
- Elcismia* B. L. Robinson in Proc. Amer. Acad. XLIX. (1913) 511.

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8916. *Olearia* Moench, Meth. Suppl. (1802) 254.—T.: *O. tomentosa* (Wendl.) DC.
8918. *Sommerfeltia* Less. Syn. Compos. (1832) 189; non *Sommerfeltia* Schumacher et Thonn. Beskr. Guin. Pl. (1827) 331; nec *Sommerfeltia* Flörke apud Sommerfeldt in K. Norske Vidensk. Skrift. II. pars 2 (1827), 60.—T.: *S. spinulosa* (Spreng.) Less.
8994. *Cassinia* R. Br. in Trans. Linn. Soc. XII. (1817) 126; non R. Br. ex Ait. Hort. Kew. ed. 2, V. (1813) 184.—T.: *C. aculeata* (Labill.) R. Br.
9006. *Helichrysum* Mill. corr. Pers. Syn. II. (1807) 414.—T.: *H. orientale* Gaertn.
9028. *Angianthus* Wendl. Coll. II. (1809) 31, t. 48.—T.: *A. tomentosus* Wendl.
9150. †*Podanthus* Lag. Gen. et Sp. (1816) 24; non *Podanthus* Haw. Syn. Pl. Succ. (1812) 32.—T.: *P. ovatifolius* Lag.
9168. *Selloa* H.B.K. Nov. Gen. et Sp. IV. (1820) 265, t. 395; non Spreng. Nov. Prov. Hort. Halens. et Berol. (1819) 36.—T.: *S. plantaginea* H.B.K.
9192. *Wedelia* Jacq. Enum. Pl. Carib. (1760) 8, 28; non Loeff. Iter. Hisp. (1756) 180, nomen rejic.—T.: *W. fruticosa* Jacq.
9208. *Salmea* DC. Cat. Hort. Monspel. (1813) 140; non *Salnia* Cav. Icon. III. (1794) 24, t. 246; nec Willd. in Mag. Ges. Nat. Fr. Berlin, V. (1811) 399.—T.: *S. scandens* (L.) DC.

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- Sharwia* J. R. et G. Forst. Char. Gen. (1776) 95, t. 48.
- Chronochiton* Cass. in Dict. Sc. Nat. LVI. (1828) 220.
- Achromolaena* Cass. l.c. 222.
- Apalochlanys* Cass. l.c. 223.
- Rhynea* DC. in DC. Prodr. VI. (1837) 154.
- Elichrysum* Mill. Gard. Dict. Abridg. ed. 4 (1754).
- Siloxerus* Labill. Nov. Holl. Pl. Sp. II. (1806) 57, t. 209.
- Euxenia* Cham. in Nees, Hor. Phys. Berol. (1820) 75.
- Feaea* Spreng. Syst. III. 362 (1826); non *Feea* Borg. (1824).
- Pascalia* Ortega, Nov. Pl. Matrit. Descr. Dec. (1797) 39.
- Hopkirkia* Spreng. Nov. Prov. (1819) 23; Syst. III. (1826) 443.
- Fornicaria* Rafin. Sylva Tellur. (1838) 116.

9241. **Balduina** Nutt. Gen. II. (post Mai. 1818) 175 [non *Baldwinia* Rafin. in Am. Monthly Mag. II. (Feb. 1818) 267, sine descr.]—T.: *B. uniflora* Nutt.
9247. **Marshallia** Schreb. Gen. II. (1791) 810; non J. F. Gmel. Syst. II. (1791) 836.—T.: *M. lanceolata* Pursh.
9258. **Laya** (minus rite *Layia*) Hook. et Arn. Bot. Beechey's Voy. (1833) 148, nomen provisorium; DC. in DC. Prodr. VII. (1838) 294; non *Layia* in Hook. et Arn. l.c. (1833) 183.—T.: *L. gaillardoides* (Hook. et Arn.) DC.
9285. **Villanova** Lag. Gen. et Sp. Pl. (1816) 31; non Ortega, Nov. Pl. Descr. Decad. (1797) 47, t.6.—T.: *V. alternifolia* Lag.
9289. **Thymopsis** Benth. in Benth. et Hook. f. Gen. Pl. II. (1873) 407; non Jaub. et Spach, Illustr. Pl. Or. I. (1843) 72, t. 37.—T.: *T. Wrightii* Benth.
9291. **Schkuhria** Roth, Cat. Bot. I. (1797) 116; non Moench, Meth. (1794) 566.—T.: *S. abrotanoides* Roth.
9322. **Oedera** L. Mant. II. (1771) 159; non Crantz, De Duab. Dracon. Arb. (1768) 13.—T.: *O. prolifera* L. f.
9365. **Peyrousea** DC. in DC. Prodr. VI. (1837) 76; non *Peyronisia* Poir. in Dict. Sc. Nat. XXXIX. (1826) 363.—T.: *P. calycina* DC.
9382. **Robinsonia** DC. in Guillem. Arch. Bot. II. (1833) 333; non Scop. Introd. (1777) 218, nomen superfl.—T.: *R. macrocephala* Decne.
9412. **Ligularia** Cass. in Bull. Soc. Philom. (1816) 198; non Duval, Pl. Succul. Hort. Alençon (1809), II.—T.: *L. sibirica* Cass.
9428. **Tripteris** Less. in Linnaea, VI. (1831) 95; non Thunb. Dec. Fl. Bras. I. (1817) 14.—T.: *T. arborescens* (Jacq.) Nees.
- Mnesiteon* Rafin. Fl. Ludov. (1817) 67.
- Endorima* Rafin. in Am. Monthly Mag. IV. (1819) 195.
- Phylemopsis* Juss. ex Poir. Encycl. Suppl. IV. (1816) 405.
- Blepharipappus* Hook. Fl. Bor. Am. I. (1834) 316, partim.
- Unxia* H.B.K. Nov. Gen. et Sp. IV. (1820) 279.
- Tetracarpum* Moench, Meth. Suppl. (1802) 240.
- Senecillis* Gaertn. Fruct. II. (1791) 453, t.173.
- Tripterachaeonium* Kuntze, Rev. Gen. III. sect. 2, pars 2 (1898), 182.

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9446. *Siebera* J. Gay in Mém. Soc. Hist. Nat. Paris, III. (1827) 344, in adnot.; non *Sieberia* Spreng. Anleit. ed. 2, II. pars I (1817), 282; nec *Siebera* Hoppe in Flora, II. (1819) 24.—T.: *S. pungens* (Lam.) DC. (*Xeranthemum pungens*).

9457. *Saussurea* DC. in Ann. Mus. Paris, XVI. (1810) 156, 196; non Salisb. in Trans. Linn. Soc. VIII. (1807) 11, in obs., nomen rejic.; nec *Saussuria* Moench, Meth. (1794) 388.—T.: *S. alpina* DC.

9483. *Moquinia* DC. in DC. Prodr. VII. (1838) 22; non Spreng. f. Tent. Suppl. (1828) 9.—T.: *M. racemosa* DC.

9511. *Schlechtendalia* Less. in Linnaea, V. (1830) 242; non Spreng. Syst. IV. Cur. Post. (1827) 295; nec Willd. Sp. Pl. III. pars 3 (1804), 2125.—T.: *S. luzulifolia* Less.

9545. *Moscharia* Ruiz et Pav. Fl. Peruv. et Chil. Prodr. (1794) 103; non Forsk. Fl. Aegypt. Arab. (1775) 158.—T.: *M. pinnatifida* Ruiz et Pav.

9578. *Raffinesquia* Nutt. in Trans. Amer. Phil. Soc. n. s. VII. (1841) 429; non Rafin. New Fl. Amer. III. (1836) 51; nec Rafin. Fl. Tellur. II. (1836) 96; nec Rafin. Sylva Tellur. (1838) 79.—T.: *R. californica* Nutt.

——. *Thorellia* Gagnep. in Lecomte, Not. Syst. IV. (1920) 18; non Hance in Journ. Bot. XV. (1877) 268.—T.: *T. montana* Gagnep.

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*Flaurolia* Reichb. Nom. (1841) 90.

*Theodorea* Cass. in Dict. Sc. Nat. XLVII. (1827).

*Spadonia* Less. Syn. Compos. (1832) 99; non Fries (1829).

*Chamissoinicia* Kuntze, Rev. Gen. I. (1891) 326.

*Moschifera* Molina, Saggio Chile, ed. 2 (1810), 294.

*Nemoseris* Greene in Pittonia, II. (1891) 192.

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### XIII—NOTES ON CAREX: XII.\* E. NELMES.

#### A NEW MEXICAN SPECIES.

A rather large proportion of the *Carices* collected in Mexico by Mr. & Mrs. E. K. Balls and Mr. W. B. Gourlay are unfortunately not much beyond the flowering stage. This makes identification difficult, especially as herbarium material of Mexican *Carices* is scanty. A further unfortunate result is that several species which are probably new to science are not sufficiently mature for description. One of them, however, is quite well advanced in fruit and is described below.

***Carex Ballsii* Nelmes**, sp. nov. ; affinis *C. consorti* C. B. Clarke, sed spicis magis densifloris, squamis marginibus non albo-hyalinis, utriculis leviter obliquis inferne compresso-trigoni differt.

*Rhizoma* caespitosum, validum. *Culmi* validi, erecti, circiter 120 cm. alti, triquetri, faciebus concavi, superne scabri, inferne foliati, basi vaginis aphyllis fuscis circumdati. *Folia* culmis aequilonga, 7–10 mm. lata, rigida, coriacea, marginibus revoluta, glauco-viridia, carinata; vaginae tenuiter membranaceae, rubido-brunneae, demum parce reticulatim fissae. *Spicae* circiter 20, superioribus 2–3 exceptis binae, androgynaeceae (parte mascula brevi), cylindricae, plerumque 3.5–8 cm. longae, circiter 5 mm. latae, densiflorae, plerumque nutantes, inferiores subapproximatae, aequaliter longipedunculatae, interdum basi breviter ramosae, superiores approximatae, inaequaliter pedunculatae, pedunculis scabriusculis. *Bractae inferiores* foliaceae, inflorescentiam superantes, brevissime vaginantes, superiores minores vel squamiformes. *Squamae* ovato-ellipticae, atro-castaneae, stramineo-carinatae, plerumque apice muticae. *Utriculi* squamas paullo superantes vel raro eas aequantes, 3–5 mm. longi, superne subinflato-trigoni, inferne compresso-trigoni, oblongo-elliptici, glabri, membranacei, leviter obliqui, demum subpatentes, marginati, enerves, valde stipitati, in rostrum breve ore oblique sectum bidentulum subabrupte contracti. *Nux* oblonga vel oblongo-obovoidea, medio constricta, obliqua. *Stigmata* 3.

MEXICO: Vera Cruz; Loma-Grande, Mt. Orizaba, 2910 m., 27 April 1938, *Balls & Gourlay* B. 4371.

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\* Continued from K.B. 1939, 659.

#### XIV—NOTES ON CAREX: XIII.\* E. NELMES.

##### AFRICAN ALLIES OF *C. PENDULA* HUDS.

*Carex pendula* Huds. is one of the better known British *Carices*. It is by no means one of the commonest of our sedges, but its large size and the pendulous habit of its spikes, combined with its gregariousness, make it very conspicuous in late spring.

This species is one of a large number of common European plants which have an almost exclusively European distribution, just extending into west Asia and north Africa. It has, however, spread southwards, like some other *Carices*, and changed its characters on the journey. A species which has hitherto been known as *C. Petitiiana* A. Rich. represents it in north-east tropical Africa, *C. Bequaerti* De Wild. replaces this on the more southern mountains of tropical Africa, and, lastly, *C. Mossii* Nelmès completes the long journey to the Cape.

There are no near relatives of *C. pendula* in North America, nor in Asia, and, as we might expect, none either in South America or in Australasia.

It is interesting to note that some of the characters which distinguish these tropical African species from the European *C. pendula* bear a close resemblance to those which differentiate many of the African *Elatae* (see Note IV in this series) from their relatives in south-western Europe. The terminal male spike of Europe tends to become gynaeceandrous in tropical Africa, the female spikes are thicker and the whole plant stouter.

##### I.

When the type material of *Carex Petitiiana* A. Rich. was recently examined it was found to consist of two very distinct species.

Only one specimen of the some half dozen on the type sheet represents the plant which has been known as *Carex Petitiiana* by every authority on the *Cyperaceae* since the publication of the name in 1851 (A. Rich. Tent. Fl. Abyss. 2, 513). This specimen consists of but a single flowering culm without its basal portion. An analysis of the description of *Carex Petitiiana* shows that this insignificant portion of the plant material is clearly referred to by only about one tenth part of the essential points.

The overwhelming part, therefore, of both the material and its description, including the key portion, belongs to another species. This, therefore, I submit, is the true *C. Petitiiana* A. Rich. It is intermediate between *C. longipedunculata* K. Schum. and *C. cuprea* (Kükenth.) Nelmès (*C. longipedunculata* K. Schum. subsp. *cuprea* Kükenth.), members of Kükenthal's Section 62 : *Elatae*. Incidentally, when I raised this second plant to specific rank, in 1938, I had no occasion to borrow the type of *C. Petitiiana* A. Rich., because this species, as mentioned above, was generally regarded as belonging to a wholly unrelated Section of the genus (Section 46 : *Maximae* Aschers.).

The question of the name of the plant eliminated from the above mentioned material now arises.

The only name cited in synonymy by Kükenthal in Engler's Pflanzenreich under the name *C. Petitiiana*, apart from C. B. Clarke's misidentification as *C. pendula* Huds., is *C. anomala* Steud. (Synops. Cyper. 230 : 1855), a later homonym of *C. anomala* Pall. (1808). Boeckeler (Flora, 40, 411 : 1876) and Clarke (Durand & Schinz, Consp. Fl. Trop. Afr. 5, 689 : 1894), however, cite *C. robusta* Hochst. mss. as a synonym.

De Wildeman (Pl. Bequaert. 4, 246 : 1927) described a similar plant from the Belgian Congo under the name *C. Bequaerti*. Incidentally, he states that he considers his species belongs to the Section *Elatae* (Pflanzenreich IV.20, 645-657), with *C. longipedunculata* K. Schum. as its nearest relative. Actually the *Maximae*, to which *C. Bequaerti* belongs, is a Section far removed from the *Elatae*. This species may be specifically distinct from the Abyssinian plant eliminated from *C. Petitiiana*. Its stems are taller ; its spikes are longer, with longer peduncles ; and its glumes darker and more acuminate. There is, however, scarcely any difference between the utricles of these two plants. They are strikingly similar in colour and shape, they are both subinflated and equally short-beaked, and they both contain similar nuts.

Incidentally, this utricle-similarity is also noteworthy between the Abyssinian plant and the European *C. pendula* Huds., and between *C. Bequaerti* De Wild. and a South African relative described below. This group, then, shows a striking constancy in the important utricle character throughout its entire range from Europe to the Cape.

Intermediates of various kinds between the Abyssinian and the Belgian Congo plants have been collected in Abyssinia itself, in Uganda, and in other parts of Tropical Africa.

This material, therefore, needs careful and prolonged study before its constituents can be accurately delimited. If the Abyssinian plant proves to be specifically distinct, I suggest that the epithet "*robusta*," written by Hochstetter on a sheet of it in the Paris herbarium, would be very appropriate for this giant among sedges.

## II.

Specimens collected in Natal, the Transvaal, and neighbouring regions, appear scarcely specifically distinct from *C. Bequaerti*.

There are, however, plants among this southern material which can be considered as a separate species. This has a distinctly smaller, non-inflated utricle, and a differently shaped nut.

The nut character is noteworthy because its variation in the genus is small compared with that of the utricle, in which it is enclosed, and consequently it has little taxonomic value. This is, of course, in striking contrast to the more exposed nut of most other

genera of *Cyperaceae*, where it takes on the more important distinguishing rôle of the *Carex* utricle.

**Carex Mossii** Nelmes, sp. nov. ; affinis *C. Bequaerti* De Wild. sed utriculis minoribus non inflatis, nucibus obovoideis praecipue differt.

*Folia* superiora usque 15 mm. lata, inflorescentiam superantia, supra viridia infra glaucescentia, marginibus scabrida, plana, apicem versus longe acuminata, subcoriacea. *Spicae* 7-9, plerumque 12-15 cm. longae, 5-6 mm. diametro, densiflorae, basi interdum laxiores, terminalis fere apice et basi mascula medio feminea, ceterae femineae (apice breviter masculae), superiores subapproximatae, sessiles vel subsessiles, inferiores remotae, longe exserte pedunculatae. *Bractae* inferiores foliaceae, inflorescentiam superantes, longe vaginantes, superiores minores, haud vel breviter vaginantes. *Squamae femineae* oblongo-lanceolatae vel elliptico-lanceolatae, tenues, pallide brunneae, marginibus anguste albohyalinae, apice saepe excisae, carinatae, mucronulatae. *Utriculi* 2.25-2.5 mm. longi, squamis breviores et latiores, ellipsoidei vel ellipsoideo-obovoidei, haud inflati, indistincte trigoni, membranacei, virides, punctati, glabri, utrinque tenuiter paucinerves, vix stipitati, in rostrum breve teres ore truncatum pallide brunneum leviter excisum subabrupte contracti. *Nux* 1.5 mm. longa, obovoidea, arcte inclusa, puncticulata. *Stigmata* 3.

SOUTH AFRICA : Eastern Cape Province ; Hogsback, 1 January 1927, *C. E. Moss* 999 (Kew, type) ; *Miss E. M. Young* 15, 336.

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## XV—MISCELLANEOUS NOTES.

**The Flora of Madagascar.\***—The French are very fortunate, from a biological point of view, in possessing two of the most interesting oceanic islands in the world, namely Madagascar and New Caledonia. Although Madagascar does not appear to loom very large by the side of the African continent, it is nearly as big as France itself, being a thousand miles long and up to three hundred and sixty miles wide. Like most other oceanic islands its fauna and flora are of very great interest, and in this rapidly changing world it is imperative that all possible material and information should be gathered together into museums and herbaria with the least possible delay.

Madagascar was given a wide berth by most of the early voyagers. They were more interested in the riches of the East Indies, and it was not until nearly the end of the nineteenth century that comprehensive collections were made in the more interesting interior parts of

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\* "Flore de Madagascar (Plantes vasculaires)," Publiée sous les auspices du gouvernement général de Madagascar et sous la direction de H. Humbert, Professeur au Museum Nationale d'Histoire Naturelle. Tananarive, Imprimerie Officielle, 1936.

the island by members of the London Missionary Society. The Rev. R. Baron and others sent a wealth of specimens to Kew from about 1880 onwards, and they were worked out by the late J. G. Baker in numerous papers in various botanical journals.

From the beginning of this century the French have made large collections of plants, those of M. Perrier de la Bathie, and of Professor Humbert, the present director of the Paris Herbarium, who has made several expeditions and discovered many interesting new species, being of great importance. But so far information as to the flora as a whole has only been available in numerous scattered journals and pamphlets, and the need for a "Flora" has been felt for a considerable time. Such a work was commenced in 1936 and has made steady progress under the editorship of Professor Humbert. A departure has been made from the De Candolle system, which has so far usually been followed at the Paris Museum, and the families will eventually fall into their places in the Engler and Prantl system. Each family is published independently and with a separate pagination which may render citation somewhat difficult. There are keys and short descriptions for each species and black and white illustrations here and there. When finished we shall have at last a long-desired complete flora of one of the most interesting islands in the world, rich in endemics and teeming with phytogeographical problems,\* and it would be a great pity if the war should be the means of curtailing the progress of so important a work. We earnestly trust that Professor Humbert and his colleagues will be able to bring the work to a successful conclusion.

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**Magic Gardens.**†—Mrs. Rosetta E. Clarkson, Editor of the *Herb Journal* and the *Herb Lovers' Book Club*, has provided us with a book about herbs and gardens which possibly no one on this side of the Atlantic could have written with equal charm and enthusiasm. Mrs. Clarkson has long been eminent as a herbalist. Her monthly *Herb Journal* circulates in every American State, and her library of herbals and old still-room and garden books is one of the finest collections of its kind in the world.

Chapter II deals with herbs in the flower garden, and a useful selection of fragrant kinds may be noted in these well written pages. Chapter III is entitled "Walls and Wattles." Although there is much about these, there is interwoven an equal amount of English history and the progress of gardening is traced during the centuries. When enclosing walls were abandoned for a time, sunk fences became the vogue, just plain ditches dug around the garden area. So instead of being able to see the end of a path ahead, the visitor would suddenly be brought up short with a ditch in front of him:—

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\* See Hutchinson, *Nature*, **145**, 448 (1940).

† By Rosetta E. Clarkson. New York: Macmillan & Company, 1939. Pp. xviii+370, with numerous illustrations from the old herbals and ancient gardening books. Price 15s. net.

"The common people called this innovation a *Ha-Ha*, from the expression automatically uttered as the stroller almost pitched into the *fence* below him."

America was a new country when Elizabethans were enjoying their espaliers, pleached alleys, orchards, pleasure and kitchen gardens. New Englanders struggling through the first precarious years were too busy obtaining food, shelter and clothing to give much attention to the refinements of garden construction. But when gardens were established they were naturally modelled on those left behind in Old England. In Virginia gardens developed in true English style with box planted in patterns on lawns. Box hedges were employed because they were so useful to spread out the laundry to dry!

The section of the book devoted to "Mazes and Labyrinths" will be of particular interest to those who have failed to liberate themselves from the famous puzzle at Hampton Court. An illustration of this is given, dating from 1690.

As our space is limited an account of the remainder of this charming book cannot be given, but it will be sufficient to say that there are several more equally interesting chapters, closing with a list of noteworthy herbs and a skilfully set out historical table showing their importance from as far back as 5000 B.C.

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**Cultivation of Plants in Nutrient Solutions.\***—The cultivation of plants in solutions of mineral salts, or in a substratum of sand, cinders or gravel impregnated with nutrient solutions, seems to have become very popular in recent years, judging from the new books on the subject which have been published. The fundamental principles of these methods of cultivation have been known to plant physiologists for a long time, but it is a comparatively new development to cultivate plants by these methods either to produce a decorative effect or for the commercial production of flowers, fruits and vegetables. Those who are interested in this subject will find the recent book on the subject by Turner and Henry very helpful, as the authors have not only outlined the theory of growing plants by these methods, but have also included practical directions for putting them into effect, both on a comparatively small as well as on a commercial scale. Whether the authors' claim that it is possible to produce bigger crops at lower cost than by ordinary cultivation in soil will be substantiated under English conditions remains to be tested. There can be no doubt that culture in nutrient solutions gives very good results when carried out in suitable localities by those who are well versed in the necessary technique, but when one sees the magnificent results obtained in large-scale commercial greenhouses in this country by well established and more

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\* "Growing Plants in Nutrient Solutions or Scientifically Controlled Growth," by W. I. Turner and V. M. Henry. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. 1939. Price 18s.

orthodox methods of cultivation, the alleged superiority of these newer methods will have to be very clearly demonstrated before large-scale commercial growers will be prepared to adopt them.

C. R. METCALFE.

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**The Liverworts of West Virginia.\***—Local Floras on the *Hepaticae* are not numerous and we therefore welcome the appearance of this small volume on the liverworts of Western Virginia by N. Ammons, a copy of which has been presented to the Library. The flora of the State is relatively rich, since it is traversed by part of the Appalachian Range. The volume follows the customary arrangement of Floras and is provided with keys both to genera and species. It concludes with an extensive bibliography and 26 plates illustrating general habit and microscopical structure of the principal genera. There are some paragraphs on the natural features of the area which lead us to hope that at a later date the author may supplement his treatise by an ecological account.

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**A Field Key to the Trees and Shrubs of Tanganyika.†**—This little "pocket book," will prove indispensable to the field botanist. B. D. Burtt was an enthusiastic collector, and his knowledge and experience over a period of twelve years has gone to the preparation of this booklet. Part I, which has now been issued, though primarily dealing only with genera, includes a certain number of species. It is clearly and compactly arranged and easy to use. The author has taken great pains to make the Key workable, and a warning is given as to possible sources of error, e.g., in the examination of immature leaves or coppiced forms. It is also emphasized that it is purely a "field-key" and not applicable to herbarium work. Part II of the work, which will provide keys for species, will be eagerly awaited by field-workers.

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\* "A Manual of the Liverworts of West Virginia," by Nelle Ammons, West Virginia University. Reprinted from "The American Midland Naturalist," vol. 23, no. 1, pp. 3-164, January, 1940, at the University Press, Notre Dame, Indiana.

† "A Field Key to the Savanna Genera and Species of Trees, Shrubs and Climbing Plants of Tanganyika Territory. Part I: Genera and some Species," by B. D. Burtt. Government Printer, Dar es Salaam, 1939. Pp. xvi+53. Price 2s.

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By the South Essex Recorders, Ltd., Ilford.

(713) Wt. 18/32 800 5/40 S.E.R. Ltd Gp. 381

# BULLETIN OF MISCELLANEOUS INFORMATION No. 4 1940 ROYAL BOTANIC GARDENS, KEW

## XVI—NOTES ON SOME GRECIAN SEMPERVIVA.

R. S. WALE

Apart from the account in Halácsy's "Conspectus Florae Graecae," there exists practically no reliable, and certainly no detailed, published information on the Grecian and Albanian *Semperviva*. Praeger, in his "Account of the genus *Sempervivum*" (London: 1932), completely ignored these two countries and sub-merged *S. marmoreum* Grisebach and *S. Reginae-Amaliae* Held. & Guic., both Grecian in origin, under *S. Schlehani* Schott without comment and contrary to the International Rules of Nomenclature. Older writers give only scanty, or even inaccurate, information thereon, although it was quite clear from these references that there were many *Semperviva* to be found throughout Greece, their specific nature, however, remaining in doubt. No reference was made to Albanian plants, except the mere record of the occurrence of *S. marmoreum* Griseb. and *S. Heuffelii* Schott without further details, but this was to be expected as the difficulties in the way of botanical expeditions to this country were immense.\*

In 1937 E. K. Balls visited Greece and spent most of his time in the Epirus and Grammos mountains (see fig. 1). At my request he paid special attention to the *Semperviva* and made a representative collection of specimens. With reference to their distribution he noted (in litt.):

"In answer to your question as to whether *Semperviva* were absent from any area I think that on every high mountain we found some. The central Pindus, about Agrafa, appears to have provided only *S. Heuffelii* and I think that in the Epiroan Peristeria there was very little else, the other species we found there was only in very small quantity. Below about 7000 ft. I do not think we found *Semperviva* at all; they were usually pretty high on all the mountains and not nearly so free growing on the southern mountains as on the northern ranges. The Grammos mountains were much more prolific than any others which we visited."

These plants could quite readily be divided into three groups:—*S. Heuffelii* Schott, a number of pubescent plants, and four glabrous specimens.

The four glabrous plants were collected from Mt. Tschumba Petzi, Mt. Kambeecho, and Mt. Skrutsch (three adjoining peaks, between the mountains of Grammos and Mavri Petri, of the Grammos

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\* I have now a number of Albanian *Semperviva* in cultivation but as they have not yet flowered description would be premature.



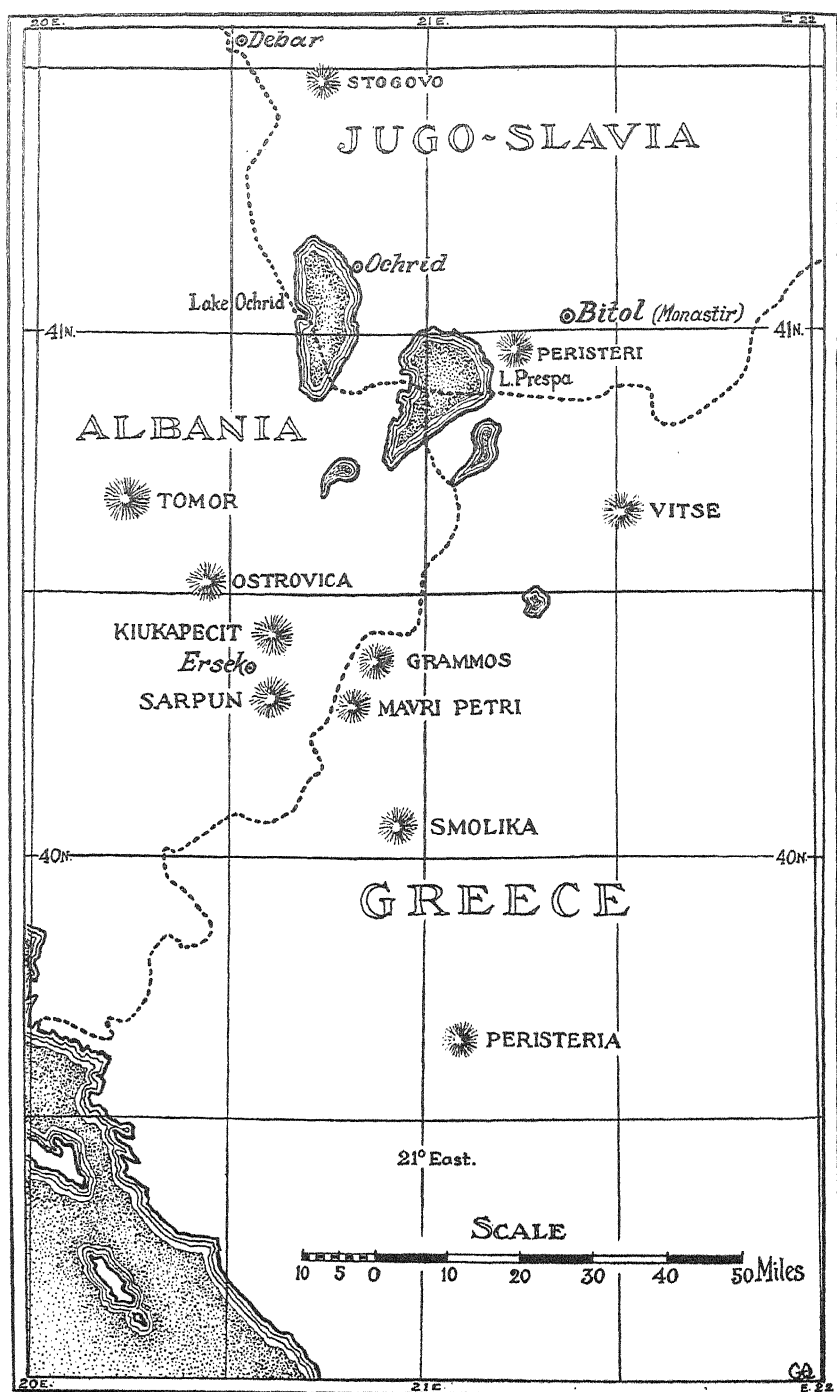


Fig. 1. Sketch map showing mountains referred to in the text.

range on the Albanian-Greek frontier), and from Smolika, which is about twenty-five miles to the south of these. Although these plants showed small individual variations they appeared to belong to a single species which could not be matched with any existing description or material. The Tschumba Petzi plant flowered for the first time in 1939 and is described below as a new species. The Kambeeche and Skrutsch plants have also flowered, though not quite normally, and the one from Smolika has not yet flowered. On continued observation these three plants are sufficiently near to the type to warrant their inclusion, at least for the time being, in this species.

The field note for the Tschumba Petzi plant is as follows:—  
“ B 3961a, Tschumba Petzi near Grammos, 8500 ft., 4.9.37.

This is probably the same as 3961, though growing in very different conditions it appears completely different. Leaves a bright glossy green and apt to stiffen outwards making a rather flattened rosette to 2 ins. across. Growing on steep grass banks in shade of tufts of long grass. A grey claylike soil, rather wet. (These rosettes are all that were collected and the plant does not seem very profuse in this situation.) ”

In cultivation the above notes apply to plants in the spring or when grown in the shade, but given full exposure the rosette becomes more globular, the leaves shorter, thicker and more erect or even incurled, and the whole rosette more dense. The central leaves remain bright green while the outermost leaves develop pink shades. When viewed either from above or from the side the absence of marginal cilia is very striking, the leaf appearing to have a rounded edge not shown by any other species. The plant does not increase very rapidly, giving off only a few stolons each year, but grows well, slowly forming a close clump in which the rosettes are decidedly below more isolated ones in size. When established it flowers readily in late July and early August and may go on into September. It stands the winter satisfactorily.

**Sempervivum Ballsii** *Wale*, sp. nov.; a *S. marmoreo* Griseb. planta minore, rosularum foliis erectioribus apicibus haud purpureis parte superiore marginibus eciliatis, inflorescentia minore compactiore languidiore differt; a *S. Reginae-Amaliae* Held. et Guic. rosularum foliis glabris, caulibus floriferis minus puberulis, foliis paucioribus, floribus languidioribus distinguitur.

*Rosettes* about 3 cm. across (2.5 to 3.5 cm.) sub-globular, inner leaves closed, outer more open and erect, but the short thick leaves give the rosette a dense appearance. In the spring the outer leaves longer and thinner and the rosette as a whole more open. *Rosette leaves* about 18 mm. × 6.5 mm. × 1.7 mm., obovate, abruptly mucronate, slightly convex on face, convex on back, glabrous, sparingly ciliate on lower two-thirds, no cilia on upper third, bright green with olive to yellow tinge, outermost leaves tinged yellow to light red. Leaves of young rosettes lightly hairy on midrib and ciliate almost

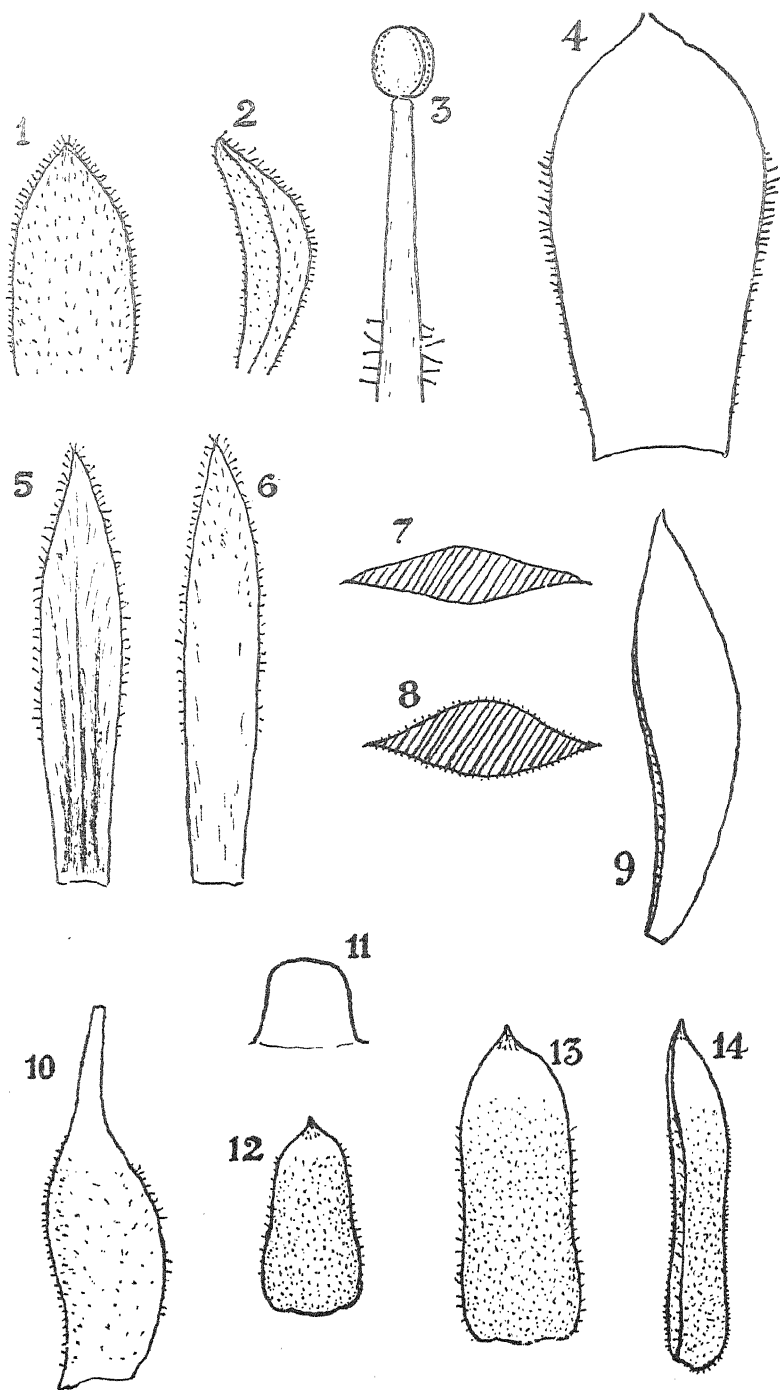


Fig. 2. *Sempervivum Ballsii*.—1, Sepal, abaxial surface; 2, Sepal, lateral view; 3, Stamen; 4, Rosette leaf, abaxial surface; 5, Petal, adaxial surface; 6, Petal, abaxial surface; 7, Rosette leaf, transverse section; 8, Cauline leaf, transverse section; 9, Rosette leaf, lateral view; 10, Carpel; 11, Scale; 12.

to tip. *Offsets* three to four in May. *Stolons* basal, horizontal, thick even when young, 1-1.5 cm. long, up to 2 mm. thick with a few ovate leaves hairy on both faces. *Flowering stem* 10 cm. high, broad at base narrowing abruptly, rest of stem hardly tapering at all, sparingly clothed with erect only slightly overlapping leaves, lower ones linguiform upper oblong to ovate-lanceolate, 17 mm.  $\times$  5.5 mm.  $\times$  1.6 mm. to 9.5 mm.  $\times$  5 mm.  $\times$  1.5 mm., lower sparingly ciliate and puberulous on proximal two thirds, upper puberulous sparingly ciliate on proximal two thirds, stem sparingly hairy with short hairs. *Inflorescence* small, compact, spheroidal, flattened from above to below, about 4 cm. across, of two simple and two dichotomous branches with central bud and about twenty-five flowers sparingly covered with short hairs, bracts small and few. *Bud* ovoid, flattened at tip. *Flower* 12-parted, 1.8-2 cm. in diameter when fully open, dull rose colour, on very short pedicels. *Calyx* cup-shaped, puberulous, green with varying amount of red at tip, 5 mm. long, the segments oblong-lanceolate 3 mm.  $\times$  1.2 mm.  $\times$  0.7 mm. *Petals* lanceolate, acuminate, 9 mm.  $\times$  1.4 mm., margins pink with broken central dull crimson band, unbroken deeper in colour and brighter at base, greenish in centre and more so on back where only the edges are pink, sparingly pubescent on back, ciliate on distal two thirds of edges hairs longest at tip. *Stamens* 4 to 4.5 mm. long, filaments crimson except for small white zone at each end, a few hairs near base; anthers ovoid, buff to pinkish-buff, pollen yellow. *Scales* about 0.5 mm.  $\times$  0.5 mm., rounded quadrate, greenish. *Ovaries* slender, pale green, finely hairy on inner surface and a few hairs on outer surface, 2.5 mm. long, styles slightly divergent, pinkish, 1.5 mm. long.

Flowers July to August (in S. England).

GREEK EPIRUS: on Mt. Tschumba Petzi, Grammos range, on steep grass banks, *E. K. Balls* 1937 (typus in Herb. Kew.).

The Grammos range is the centre of a mountainous area rich in *Semperviva*, but the only known species at all similar to *S. Ballsii* are *S. marmoreum* Griseb. and *S. Reginae-Amaliae* Held. et Guic. With regard to *S. marmoreum* I have not yet obtained living plants from Mt. Athos but after examining some good flowering material in the Kew Herbarium I agree with Dr. Turrill (Bull. Soc. Bot. Bulgaria, 7, 126: 1936), in accepting this as the same as *S. Schlehani* Schott which it then supersedes, being described ten years earlier. In rosette the distinction of *S. Ballsii* from *S. Reginae-Amaliae* is easy as the latter plant has puberulous rosette leaves. When in flower the plants are readily distinguished as *S. Reginae-Amaliae* has flower stems with crowded, thick, ovate leaves and brightly coloured flowers, while *S. Ballsii* has much less well clothed and less hairy stems and dull coloured flowers. From *S. marmoreum* it is distinguished by its smaller size, more upright habit of the rosette leaves, which are never purple tipped and have no cilia on the distal third of the leaf margins, and the smaller, more compact

and duller inflorescence. *S. octopodes* Turrill from Mt. Peristeri, N. Macedonia, and *S. ciliosum* Craib from Mt. Mali Hat, Galicića range, between lakes Ochrid and Prespa, are the next nearest species geographically, but both are readily distinguished by their hairy rosette leaves, yellow flowers and many other details. *S. macedonicum* Praeger has not been recorded farther south than Mt. Krcin above Debar on the Serbian-Albanian frontier and this also has pubescent rosette leaves. The rosette of *S. Ballsii* is similar to *S. minor* Turrill (mss.) but the rosette leaf of the latter is quite different in shape with marginal cilia almost to the tip, and the flower is yellow.

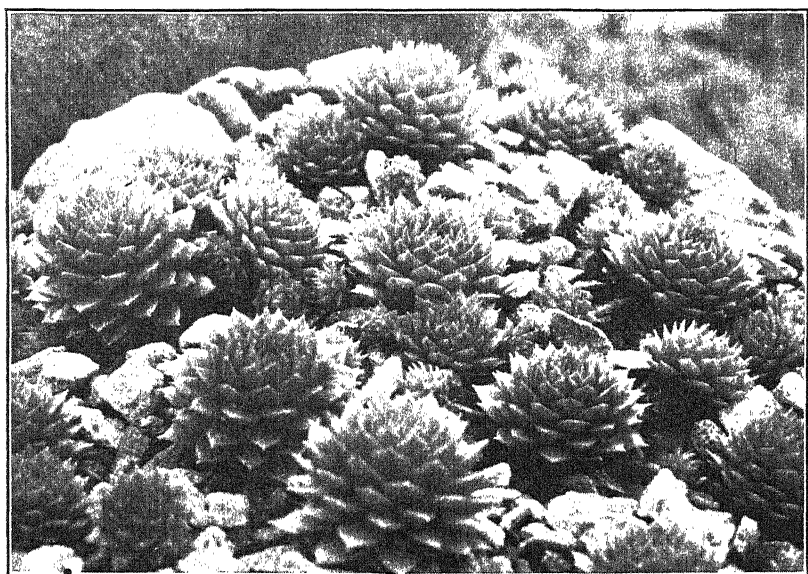
The comparison of the new species given in the table below is made on the basis of eighteen specimens of *S. marmoreum* collected in Bulgaria, Yugoslavia, and Albania and on a plant from Mt. Vardusa, Greece, collected some years ago by Miss D. Lowe and on additional material from the same locality collected in 1937 by E. K. Balls, which I regard as typical *S. Reginae-Amaliae*. Contrary to Praeger (op. cit. 59, "green with rarely a red-purple tip, or flushed red over face and back—mostly excepting the margin") all my collected forms of *S. marmoreum* are red-brown tipped, commonly very deeply so.

		<i>S. marmoreum.</i>	<i>S. Ballsii.</i>	<i>S. Reginae-Amaliae.</i>
Rosette	...	Very variable in size, medium to large, half open sub-dense. Leaves fairly numerous.	Small to medium, compact, dense, few leaves.	Small to medium, compact, dense, not many leaves.
Rosette leaf	...	Spathulate. Deep green, strong brown-purple tip or distal half. Margins strongly ciliate to tip. Glabrous.	Obovate. Bright green, outer leaves colouring pink. No cilia distal quarter or third. Glabrous.	Spathulate-obovate. Dull green, outer leaves colouring light red. Ciliate to tip. Puberulous.
Rosette leaves of young offset.		Hairy.	Few hairs on midrib.	Puberulous.
Stolons	...	Medium to long.	Short.	Short.
Flower stem	...	Narrows abruptly at base, rest of stem same width. Densely hairy, long and short hairs.	Narrows abruptly at base, rest of stem same width. Sparingly hairy, short hairs.	Narrowing gradually from below up. Hairy, long and short hairs.
Inflorescence	...	Large, open, flattish.	Small, compact, spheroidal.	Small to medium, flattish.
Stem leaf	...	Deltoid-ovate to linguiform. Strongly ciliate to tip. Pubescent.	Linguiform to deltoid-ovate. Ciliate proximal three quarters. Sparingly pubescent proximal three quarters.	Ovate to oblong-ovate. Ciliate to tip. Puberulous.

PLATE V



1. *Sempervivum Ballsii* (no. B.3961), flowering rosettes.



2. *Sempervivum Ballsii* (no. B.3961), vegetative rosettes.



		<i>S. marmoreum.</i>	<i>S. Ballsii.</i>	<i>S. Reginae-Amaliae.</i>
Stem leaf	...	... Strong brown-purple tip.	Pinkish tip at the most.	Outer leaves may be pink tipped.
Petals	...	... Central bright crimson band with white margins.	Dull pink broken central band with pink margins.	Central solid crimson band.
Anthers	...	... Pink to red.	Buff to pink-buff.	Buff.
Scales	...	... Rounded, small.	Rounded quadrate.	Semicircular tip, twice as long as broad.

Apart from *S. marmoreum* Griseb., no reliable reference has been found in the literature to any glabrous Grecian *Semperviva*. Boissier records *S. tectorum* (Fl. Or. 2, 796 : 1872) as "glabris vel minute glandulosis" from Mts. Olenus and Parnassus, but gives it as equal to *S. Reginae-Amaliae* Held. et Sart. (mss.) and *S. montanum* Smith ex Prod. Fl. Graec., both pubescent plants. I have a plant from Mt. Parnassus which is hairy but none from Mt. Olenus. He also describes the variety "*marmoreum*" from Mt. Athos only, with the criterion that the scales are almost absent, giving as synonyms *S. marmoreum* Griseb. and *S. purpurascens* Schott, both of which are glabrous. Halácsy records many stations for *S. Reginae-Amaliae* Held. et Guic., again without reference to any glabrous plant. It would thus appear that the plant now described as *S. Ballsii* was unknown to these authors.

The pubescent plants collected by E. K. Balls and mentioned at the beginning of this article have, with the exception of the Vardusa plant, failed to produce satisfactory flowers. They present a number of minor differences in rosette, of which colour is the most striking, but provisionally I have placed them all together as forms of *S. Reginae-Amaliae* Heldreich et Guiccardii ex Halácsy.

There is some confusion in the literature regarding the authors responsible for the name *S. Reginae-Amaliae*. The reference from Halácsy must be regarded as correct but the source from which the description was obtained is not given. The specimen referred to by him (Fl. Gr. Exs. no. 2982, dated 1855), now in the Kew Herbarium, bears only the name. Boissier (Fl. Or. 2, 796 : 1872) records, from manuscript, *S. Reginae-Amaliae* Held. et Sart., presumably after Sartori who was working with Heldreich at the time. Praeger (op. cit. 59) gives *S. Reginae-Amaliae* Heldreich et Sarthein ex Boissier, probably by the erroneous expansion of Boissier's "Sart." It is quite clear that the same plant was intended by all these authors.

I am indebted to Mrs. H. P. Thompson and Mr. W. E. Th. Ingwersen for the many Balkan *Semperviva* with which they have so generously provided me, the results of many years skilful and accurate collecting.

I wish to thank Dr. Turrill for the help which he has so freely given me on all matters connected with the preparation of this paper.



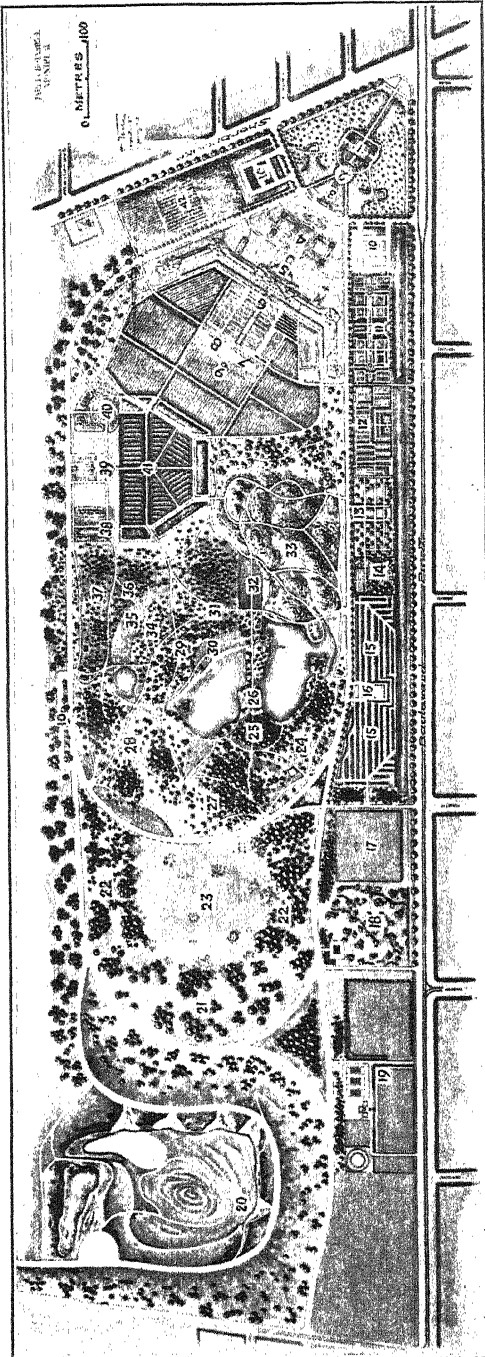
## XVII—THE MONTREAL BOTANICAL GARDEN.

P. A. CHANDLER (Montreal Botanical Garden).

The Province of Quebec is well known for its rich forests of spruce and fir, for the high standard of its agricultural crops, and for the maple sugar and maple syrup extracted from *Acer saccharum*, known to all visitors to the Province. The gardens throughout the world have been enriched with many beautiful plants native to this region, notably *Pinus Strobus*, *Tsuga canadensis*, *Cornus canadensis*, *Sarracenia purpurea*, *Primula laurentiana*, and further gems are to be expected from the Gaspé peninsula. However, with the exception of some small gardens connected with agricultural institutes, and two feeble, unsuccessful attempts to establish a botanical garden within the Province in the latter part of the last century, there was until recently no garden of any botanical importance. The necessity for such a garden had long been felt by botanists and horticulturists throughout the Province, and due to their persistent efforts, notably those of Dr. Marie-Victorin, another attempt was made in 1933 to establish such a garden.

At this time the city of Montreal presented an area of 250 acres at the east end of the city which had been at one time set aside for a public park, but was never developed and had become more or less waste land. A Botanical Garden Commission was set up to formulate and direct the policy of the gardens under the chairmanship of Dr. Marie-Victorin, the present Director of the gardens. For the first three years little progress was made except for the building of two small greenhouses. However, in the summer of 1936 a plan was designed for the whole garden as it will be eventually (see Plate VI), and this design was carefully followed in the construction work which commenced shortly afterwards and which will be outlined later. Particularly interesting and noteworthy in considering the design of this garden is the fact that the available grounds were almost entirely bare of natural growth and nearly perfectly flat. Everything had to be created from the beginning. This had the advantage that no compromises had to be made with the existing features, as is usually the case with gardens of this type, while on the other hand it has the disadvantage that it is sure to take many years before the garden can be expected to assume anything like a mature aspect. In the plan of the garden as it was conceived, the knowledge available to-day of how a modern botanic garden may best serve the cultural interests of a community—in this case in particular the city of Montreal, the Province of Quebec and the whole of Canada—was fully utilized and the greatest advantage was taken of what were considered the finest ideas that have so far evolved from existing gardens. If the achievements to date are any indication of the final result, this method will be fully justified. In the planning of any garden of this type the climatic conditions have of course to be carefully considered; here the long winters with sub-zero temperatures followed by hot summers would seem to place rather severe

PLATE VI



MAP OF THE MONTREAL BOTANICAL GARDEN

- |                                  |   |                                     |
|----------------------------------|---|-------------------------------------|
| 1. Flower garden of annuals      | 16. Formal rock garden                    | 28. Northern deciduous forest       |
| 2. Fountain                      | 17. Cricket field                         | 29. Mixed forest                    |
| 3. Cascade                       | 18. Picnic grounds                        | 30. Rich damp meadow                |
| 4. Administration building       | 19. Playgrounds                           | 31. Coniferous forest               |
| 5. Display greenhouses           | 20. Ornamental planting in an old quarry. | 32. Bog                             |
| 6. Service greenhouses           | 21. Arboretum                             | 33. Alpnum                          |
| 7. Garage and workshops          | 22-37. Natural groups representing        | 34. Red Pine association            |
| 8. Heating plant                 | Canadian flora                            | 35. Sand dune                       |
| 9. Nursery                       | 22. Western Canada                        | 36. Banks Pine formation            |
| 10. Parking places               | 23. Mid-Western prairie                   | 37. White Pine formation            |
| 11. Display garden of perennials | 24. Sugar Maple formation                 | 38. Biological-morphological groups |
| 12. Garden of economic plants    | 25. Beech formation                       | 39. Water and bog plants            |
| 13. Fruit garden                 | 26. Damp shore formation                  | 40. Genetic groups                  |
| 14. Gardens of medicinal plants  | 27. Black Maple formation                 | 41. Taxonomic garden                |
| 15. Fruticetum                   |   | 42. Breeding and testing field      |



limitations on the kinds of plants that can be grown. But fortunately it has been found possible to grow a far wider range than might have been expected due to the heavy snow covering in the winter and the cooling effect of the numerous lakes and rivers in the vicinity during the summer.

After October 1936, when the garden received the benefit from a Provincial Government Relief Scheme for the Unemployed, construction work went ahead at a rapid pace, and during the three following years until the outbreak of the war, great progress was made, although there is still a great deal to be done. The following account will give some idea of the work accomplished to date and that which remains to be carried out.

The administration building is completed, and, apart from the various garden offices which are spread over two floors, the Botany Department of the University of Montreal occupies one floor of the building. The building itself, from the exterior, has its own attraction, with a well-balanced water cascade leading up to the front entrance. To capture the botanical spirit, two inscriptions to Linnaeus and Mendel are to be found on either side of the entrance. The projecting entrance hall and winter gardens are built of a white stone, while the main body of the building is of a yellow brick. On entering, one's attention is attracted to the winter gardens, one on each side, where seasonal displays of flowering plants are maintained. Here of great fascination to the visitors are the four small aquaria, set into the wall at eye level, filled with tropical water plants and tropical fishes. The main body of the building consists of four wings with the central section devoted to a large air-conditioned auditorium for conferences, meetings, and lectures. This hall has a seating capacity for 600 people and is equipped with all the modern apparatus for the projection of moving pictures and lantern slides. Decorated in a pastel shade of green and equipped with indirect lighting, it creates a feeling of beauty and peace such as we all associate with plants, while a scientific atmosphere is provided through the names of famous botanists inscribed along the walls. Throughout the whole building with its offices, library, herbarium, and laboratories, simplicity with efficiency has been the keynote of the design. Little has been left out of what one might expect to find in such a building, and a special photographic department, a student gardeners' lecture room and laboratory, a lunch room and rest room for the staff, a well equipped seed room, where the seeds are cleaned and prepared for distribution, a labelling room and a lantern slide room are a few of its component parts. Facilities for research in plant breeding have also been provided and the large laboratory reserved for this purpose includes an air-conditioned greenhouse where light, humidity and temperature can be accurately controlled.

Directly behind the administration building will be located the display greenhouses extending in a wide V formation to a length of

1200 feet, although at the present time only the concrete foundations of these greenhouses have been built. Provision has been made for the display, all under one roof, of tropical and temperate region plants, and collections of succulents, cacti, ferns, orchids, aquatics, and alpiners. It is the intention to plant these houses in a naturalistic arrangement so as to give an indoor garden effect depicting the plant life in other regions of the world. Among the many interesting and novel features of this complex of display greenhouses the aquarium room located in the basement of the *Victoria regia* house is of special note. From the centre of this room one may view the *Victoria regia* from beneath through the glass bottom of its tank. Around the sides of the aquarium room aquaria are to be built into the walls which will be lit artificially and will contain a large collection of submerged water plants. In keeping with the modern ideas of economy the service greenhouses for the propagation of plants for the display houses and the outside gardens are located in close proximity to the display houses and are connected with them by a covered passage. Altogether there are 18 of these thermostatically controlled service greenhouses each equipped to serve some special type of culture. Two of these houses located at the end of the group have been fitted out with work tables in the centre and will be used for popular courses in horticulture, both for adults and for school children. One other house is reserved for plant breeding and one for experiments in plant physiology. The large centrally located workroom from which all the houses branch off laterally is an essential feature here because of the severe winter temperatures. Apart from propagating houses and electrically heated hot-beds, modern greenhouse equipment is not complete without a refrigerated room for the chilling and after-ripening of seeds of northern temperate zone plants to facilitate germination. This latter has been installed here in one of the greenhouse cellars. Equipment for soil sterilization has also been provided. Surrounding the houses an extensive range of heated and unheated frames, together with four cool sunken pits, furnish a complete and economic set up. The central heating plant, along with the garages, engineer's and carpenter's shops adjoining the frame yard, bring all the buildings into a very compact unit.

The principle followed in many gardens to relegate the nursery to any odd corner which may be available, no matter whether the situation or soil may be suitable, has not been followed here. Realising that the nursery is one of the most important units of the garden a large area surrounding the frame yard has been reserved for this purpose. Special sections are devoted to trees and shrubs, herbaceous plants, alpiners, and woodland plants, the latter accommodated under a well-constructed lattice shelter. This nursery area will have an aesthetic value of its own, with hedges of *Thuja occidentalis* creating vistas and giving a neat and trim appearance. Without special permission the public will not be admitted

to this enclosed area which includes not only the service houses, frames and nursery, but also a taxonomic garden which is not yet planted. Inside the fence of the nursery a wide border will be planted to provide plant material for distribution to the educational institutes and schools throughout the city for practical demonstrations. A meteorological station has also been established within this area.

Of the ornamental features which have been finished to date, the area in front of the administration building claims our first attention. Here a series of formal beds and borders, devoted especially to a display of bulbs in the spring and annuals and other bedding plants in the summer and surrounded by a broad expanse of lawn planted with conifers, forms a quiet yet imposing entrance and immediately creates a desire to seek more. The attention of passing motorists is also attracted by these displays as they pass along the main highway, and many are induced to stop and enter the gardens. Not forgetting modern modes of travel by automobile which call for adequate parking space, two comparatively large areas on either side of the entrance garden are available for the influx of visitors travelling by car who may be expected from all parts of Canada and the States. High winds play havoc in any garden and particularly here where the prevailing N.W. wind blows down from the Arctic. To afford some protection a high bank of soil was placed along this side of the garden and has been planted with trees and shrubs. A glance at the map will show a series of special gardens running parallel with the boulevard on one side of the grounds.

The first garden to be noticed is the perennial flower garden for the display of herbaceous plants. A formal arrangement with broad paths, a stone pergola at each end connected by a raised promenade, and a wide central strip of grass terminating in two small pools form the predominating features of the design. The idea, besides providing a colourful display during the whole season, is to show the best varieties of herbaceous plants in separate beds so that visitors can form their own opinion as to which they might like to grow in their own gardens. There are large beds of delphiniums, paeonies, asters, lupins, *Hemerocallis*, and dahlias, while in separate sections irises, lillies, and astilbes are displayed; with this arrangement the individual requirements of the plants can be taken into consideration much better than if all were mixed, and such plants as the gentians, for instance, which were all brought together on a specially constructed bed, have been provided with a special underground watering system. Visitors who wish to see a floral display at a certain period of the season will find something of interest in the four large seasonal sections for the months of May, June, July, August and September. The rose garden, which is such a prominent feature in many European and American gardens, is not of equal importance here owing to the uncertainty of being

able to grow roses satisfactorily under the severe climatic conditions of Montreal, but it is hoped that by judicious attention to winter protection some of the hardier varieties will succeed, notably the polyantha section. Therefore a small area in the centre of this garden has been planted with roses of this type. In contrast to the roses, tropical water-lilies are a great success in the summer in the formal pool opposite the rose beds.

Without doubt, the greatest public interest up to the present has been aroused by the economic garden, which has for its main purpose to bring about a better understanding of the commoner plants of everyday use. Directed by notices the visitors follow 'a definite route which has been so planned that all groups are passed in their order. First comes the collection of fruits, where tomatoes of all shapes, sizes, and colours, melons (for which the Island of Montreal is famous), cucumbers and gourds, as well as egg plants and peppers may be seen. The next notice reads: "Curious Plants." Here are to be found amongst others, the squirting cucumber (*Ecballium elaterium*), the gas plant (*Dictamnus albus*), and the pitcher plant (*Sarracenia purpurea*). Root crops follow, giving a kitchen garden aspect with neat rows of potatoes, turnips, parsnips, beetroots, and carrots in many varieties; these have attracted the public's attention to a marked degree. The next section may be of special interest to the French who are well known as connoisseurs of salads and the closely allied "epinards" (spinach). Amongst a fine collection of these plants are to be found numerous varieties of lettuce, sorrel, dandelion, rocket salad, orache, and the little used baselle. Although the brassicas do not hold such a place of importance here as they do in more temperate regions, many can be grown in the summer as can be seen in the next section which contains varieties of cabbage, cauliflower, Brussels sprouts, kales, etc. Under the notice "Plantes condimentaires" come the vegetables such as the leeks, onions, and other edible species of *Allium*, followed by an extensive collection of herbs. Foreign visitors are usually much interested in the plants used for food by the American Indians, and it is only appropriate that a special section should be devoted here to a display of these plants since many of the Indian tribes are still native to the country. Indian rice (*Zizania aquatica*), Indian cucumber root (*Medeola virginiana*), and Indian breadroot (*Psoralea esculenta*), along with many others, form an interesting collection. The economic importance of the seeds of legumes is ever increasing and the wide selection of peas and beans grown illustrates this fact. The universally important soybean (*Glycine max*) is not only found in this group, but also in the oil-producing plants which follow and the forage plants, which adequately illustrates its great importance amongst the commercial crops of the world to-day. Plant dyes and then textiles follow, where cotton (*Gossypium herbaceum*), flax (*Linum usitatissimum*), and jute (*Corchorus olitorius*) are to be found amongst others. The

general public as a rule has a very limited knowledge of the culture of cereals and in many cases only a vague idea of what the different kinds look like. Hence the large group of many varieties of wheat, barley, oats, rye, corn, sorghum, and buckwheat, is of great interest and educational value. The growth of the tobacco industry in Canada is increasing from year to year, hence a selection of 12 varieties is appropriate. The perfume and scented plants follow and finally the group of forage plants to finish the tour. Altogether some 490 kinds and varieties of economically important plants are grown in this garden. Each variety bears a label giving the botanical name and the common name in both French and English. Since French is the spoken language of 73 per cent. of the population, the description of the plant's history and uses is given in French. It is evident even from the short time this garden has been in operation that it has been most enlightening to the visitors from many points of view. There are countless ways by which the public benefits from a visit to this garden ; to cite only one, it gives a broader idea of the wide range of plant foods that can be grown here, and hence indirectly encourages the public to seek new varieties of food for the benefit of all concerned. Numerous parties of school children are shown round daily by a competent guide attached to the garden staff.

From the Economic Garden we pass to the Fruit Garden through a fine wooden pergola for the growing of grapes, which do exceedingly well in this Province. Besides the usual collection of apples, pears, plums, cherries, and other small fruits, nuts are also being grown, and include the pecan (*Carya Pecan*), butternut (*Juglans cinerea*), and walnut (*Juglans nigra*). The various methods of training fruit trees is also exhibited in a row of espalier pears. A medicinal garden, which at the present is still unfinished, completes a series of gardens where plants are grown that are of importance to man from an economic point of view.

Climatic conditions seem to favour the growth of alpenes, and the large alpine garden, which is still in the course of construction, promises to give a good representation of the alpine flora of the world. This will be accomplished by grouping the plants on a series of mounds, each mound representing a different mountain range such as the Alps, the Pyrenees, the Balkans, the Himalayas, the mountains of Japan, the mountains of Eastern North America, the Rocky Mountains, etc. Only botanical species and varieties will be planted here, while improved horticultural forms and garden hybrids will be grown on a series of formal stone beds and dry walls in another part of the grounds. Through the Alpine Garden several streamlets will meander down to two large lakes which have been constructed. Around these lakes much natural planting will be done representing the bog and aquatic flora of the Province, which is particularly rich. A large area in this part of the gardens will be developed to illustrate the most important native



plant associations of Eastern Canada. Sugar maple, black maple, white pine, and mixed coniferous forest, with all the shrubs and herbs that usually accompany them in nature, will be the most important components of this native section, which will enable visitors to study Canadian plants in their natural habitat without having to travel thousands of miles.

So far the only progress made with the Arboretum is the gathering together in the nursery of young plants from propagating material obtained from all parts of the world. Next spring, however, it is hoped that time will be found to plant the Fruticetum beds which are arranged in a series of terraces with broad grass paths. This system has its advantages, not only because it permits the visitors a convenient view of the plants, but also because of the thorough drainage it provides. This drainage is most important in the spring when heavy flooding often occurs through the accumulation of water from the melting snow. This spring flooding is a problem throughout the garden, for the soil varies from a porous sand to a heavy clay, and to minimize the losses caused by waterlogging an extensive system of drainage has had to be installed. Fortunately at the end of the garden there is a quarry from which large quantities of stone have been taken for drainage and building throughout the garden. Eventually the quarry will be planted in a naturalistic manner to form a sunken garden.

As noted above, the water flora of the Province is extremely rich, hence an aquatic garden has a place of importance. Over 100 basins of various sizes have been constructed in such a manner that the water level in each one can be controlled as desired. Some basins with running water provide suitable homes for plants from swift running streams. The paths between the basins are sunken so that the plants can be viewed conveniently at table height and their beauty easily be seen. To-day much interest is being shown in biology and genetics, so that a collection of plants illustrating some of the principles of these branches of science will not only prove of interest to the student but also to the layman who reads so much about them in the popular journals of the day. The biological and morphological garden, and the genetics garden, constructed but not yet planted, are located on either side of the water and bog garden. A large area near the nursery has been reserved for plant-breeding experiments which the garden staff hopes to conduct after the construction of the garden is finished. Part of this area is used as a testing ground for new varieties of annual and other plants before they are used elsewhere in the garden, and much valuable information has already been gleaned from these tests.

Believing in the old truth that the younger one starts to learn of the beauties and uses of plants the greater will be one's appreciation in later life, the children have been encouraged. First, children may join a special kindergarten class where simple illustrated talks are given in the winter, followed by demonstrations on living plants

in the summer. Later as they grow up they may partake in the school gardening classes where each child is given a small plot of its own to cultivate under the guidance of a qualified teacher who gives lectures at the schools during the winter. One hundred took part in this endeavour last year. Following the example of other institutes of this kind a course for student gardeners has been organized here, and at present there are some 15 students gaining theoretical knowledge by following a series of lectures on the principles of botany and horticulture. An unusual feature not often incorporated in a botanic garden which has yet to be mentioned is a well equipped playground located on the north west corner of the grounds. It provides a wading pool and other play apparatus for small children as well as three tennis courts and ample space for cricket, football and baseball. During the winter it serves as a skating and hockey rink. A large area for a picnic ground which adjoins the playground is still under construction.

Much work has yet to be done and, as elsewhere throughout the world, the present crisis unfortunately has forced a standstill of the construction work, but let us hope that the day will soon come when the world will be at peace again, and the construction of this highly promising enterprise can be resumed. In the meantime the maintenance of the valuable collections of plants gathered during the past few years from all parts of the world is at least temporarily assured so that when the time comes, stock plants will be available for the raising of large quantities of plants for planting the unfinished sections of the garden. Even under the most favourable conditions it will take many years before this garden has that appearance of age and maturity which mark so many gardens of this nature throughout the world. But if progress continues as it has done during the past three years, and if the policy outlined in the beginning is followed in the future, the Montreal Botanical Garden promises to become eventually an institution of which the British Empire can justly be proud.

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#### XVIII—THE URICURY WAX PALM. F. N. HOWES.

A little-known vegetable wax, known as "uricury wax," believed to be new to commerce, has been imported into the United Kingdom from Brazil during the last few years. This wax is also known to have been shipped to some extent to the United States and to certain European countries, notably France and Germany, in small quantities.

In general appearance and in hardness this wax is very similar to carnauba wax (*Copernicia cerifera* Mart.), but manufacturers using it find it possesses certain definite characteristics of its own. In the crude state it is a deeper green colour than is usual with carnauba wax and more resinous. However, it is regarded as quite a good quality wax and intermediate in value between carnauba and

*odorata* and *C. Weddelliana* " growing in the open in the Brisbane Botanic Garden in 1913 remarked that " The first four mentioned are very similar in habit ; the first being grown in thousands about Brisbane. They are easily grown, seemingly being not particular as to soil or situation, although on fairly free soil the best results are obtained. Their rapid growth is an important point in their favour, as is also the absence of spines, a great drawback to many showy palms. Being shallow rooters the various kinds of *Cocos* may be safely transplanted, even when quite large, if ordinary care is observed in the operation, and a time chosen other than when the young leaves are in a sappy condition."

A photograph which this writer gives of a palm of *Syagrus coronata* in the Brisbane Botanic Garden depicts it as a well-grown palm probably about 9 m. in height and 2.5 dm. in diameter. The column of dead leaves under the leaf crown, so characteristic of the palm in the wild state, is absent, the dead leaves having been probably removed from time to time for the sake of appearance.

Whether wax secretion takes place on the under surfaces of the leaves when the palm is grown in other countries, or to what extent, is not at present known. A young palm a few feet in height growing in the somewhat unnatural conditions of the Palm House at Kew clearly shows wax secretion on the undersurfaces of the leaves.

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### **XIX—CONTRIBUTIONS TOWARDS A FLORA OF BHUTAN : I. C. E. C. FISCHER.**

Comparatively little botanical work has been done in the Indian State of Bhutan since the days of W. Griffith and J. D. Hooker. Mr. B. J. Gould, I.C.S., Government Agent for the States of Sikkim and Bhutan, has taken a keen interest in the flora during the past two years and has sent a considerable collection of herbarium material, as well as seeds, to Kew for determination. The first consignment of about 1100 numbers includes 4 new species already published (K.B. 1939, 663), a new variety, and some species which have not previously been collected either in India or at least in the Eastern Himalayas. In the following list of the new records the countries entered in brackets after the specific name indicate the regions from which the species has previously been recorded.

**Hydrangea yunnanensis** *Rehd.* [Hydrangeaceae]. (Yunnan).

Tsanka, 2300 m., fls. June, *Gould* 380, 381, " fls. blue " ; *Gould* 679, " fls. white."

**Pleurospermum Davidii** *Franch.* [Umbelliferae]. (W. China).  
Kitiphu, 4150 m., fls. June, *Gould* 530.

**Cremanthodium humile** *Max.* [Compositae]. (S.E. Tibet and W. China).

Yala, Piala and Gilela areas, 4600 m., fls. Aug. *Gould* 1325.

**Saussurea Chapmani** *C. E. C. Fischer* [Compositae]. (S.E. Tibet).  
Bele-La to Paro, 3700 m., fls. July. *Gould* 966.

**Chimaphila japonica** *Miq.* [Ericaceae]. (W. China to Japan).  
Near Chendebi, 2300 m., fls. June, *Gould* 686.

**Trachaelospermum cathayanum** *C. K. Schneid.* [Apocynaceae]. (China).

Hinglai-La to Nahi, 2500–2000 m., fls. May, *Gould* 271 ; near Tsarza-La, 2770 m., fls. June, *Gould* 309.

**Lagotis yunnanensis** *W. W. Smith* [Selaginaceae]. (Yunnan).  
Near Bumtang, 3000 m., fls. June, *Gould* 441.

**Euphorbia sikkimensis** *Boiss.* subsp. *bhutanica* *C. E. C. Fischer*, subsp. nov. [Euphorbiaceae] ; a typo caulis, foliis subter, pedunculis, ovariis, stylisque hirsutis distincta.

*Stems* 20 cm. or more tall, glabrous below, increasingly flocculent-hairy upwards. *Leaves* linear or linear-lanceolate, acute, narrowed to a rounded base, 3–5·7 cm. long, 8–17 mm. wide, glabrous and dark green above, grey flocculent-hairy below, lateral nerves numerous, obscure, ascending, much reticulated, the upper sometimes reddish ; petioles very short. *Peduncles* up to 5 cm. long, slender, sparsely pubescent ; partial peduncles up to 1·5 cm. long. *Floral leaves* sessile, broadly ovate to subrotund, acute, base rounded or truncate, 1·1–1·3 cm. long, 9–10 mm. wide, glabrous, red or olivaceous-red (when dry). *Involucral-leaves* like the floral but smaller. *Cyathium* turbinate, 2·5–3 mm. long, mouth with 5 short, triangular teeth, white-hairy within ; glands subreniform, 1 mm. long, 2·6 mm. wide. *Stamens* ∞ ; filaments angled, 1·1 mm. long, glabrous ; anthers subglobose, 0·5 mm. diam. *Ovary* articulated on a short glabrous stipe, smooth, subglobose, 1·1 mm. long, more or less hairy ; styles 3, united in their lower third, more or less hairy, bifid at the apex. *Ripe fruit* not seen.

Chang-Na Na to Paro, 2950–2400 m., fls. May, *Gould* 128 (type in Kew Herb.).

**Bulbophyllum shweliense** *W. W. Smith* [Orchidaceae]. (W. China).

Near Tsanka, 2300 m., fls. June. *Gould* 388.

**Cypripedium guttatum** *Sw.* [Orchidaceae]. (Siberia, Tibet, China).

Paro to Bele-La, 2400–3300 m., fls. May, *Gould* 142.

This species was also found near Pa-roo in the Chumbi Valley flowering in June by *King's Collector* 452 and "about Chumbi" by *E. H. Walsh* 42.

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## XX—NOTES ON CAREX: XIV.\* E. NELMES.

### NEW AFRICAN SPECIES OF THE SUBGENUS INDOCAREX BAILL.

The main purpose of this paper is to describe three further new *Carexes* collected by Mr. E. Milne-Redhead during his 1937–38 expedition to Northern Rhodesia and Angola. (See K.B. 1939, 159.)

The name *Carex spicato-paniculata* Boeck. mss. was published, without a description, by C. B. Clarke in Durand et Schinz, *Consp. Fl. Afr.* 5, 690 (1894). He took the name from "Boeck. mss. in Rehmann. Pl. exsicc. n. 5627 (sp. nov.)."

Clarke described the species as "*Carex spicato-paniculata* (C. B. Clarke in Durand et Schinz, *Consp. Fl. Afr.* V. 690)" in *Fl. Cap.* 7, 304 (1898), and cited six gatherings, including Rehmann's. These citations were arranged on a geographical basis and no type specimen was indicated.

As one of the new species described below is closely related to *C. spicato-paniculata*, and as Clarke's citations may include more than a single species, it seems desirable to choose a lectotype.

Rehmann's plant, collected at Houtbosch, Transvaal, is at Kew, and would be made the lectotype if it were a good specimen, but its fruits are not fully developed. Their shape would probably have changed considerably if they had reached maturity, and the branches of the panicles, suberect at the time of gathering, would almost certainly have become divaricate later. These are important points in such a difficult genus as *Carex*, and as another of Clarke's cited plants is a fully developed specimen, and agrees well with his description of the species, I call it the lectotype. This is *J. M. Wood* 1190, collected at Inanda, Natal.

The choice of Wood's plant instead of Rehmann's makes C. B. Clarke alone, not Boeckeler ex C. B. Clarke, the authority for the name.

*Carex tricholepis* Nelm., sp. nov.; affinis *C. spicato-paniculatae* C. B. Clarke, sed paniculis secundariis laxioribus, squamis pubescentibus aristatis pallidioribus, utriculis majoribus magis dense pubescentibus praecipue differt.

*Rhizoma* lignosum, breve. *Culmi* usque 105 cm. alti, obtuse triquetri, laeves, foliati. *Folia* 8–11 mm. lata, flavescenti-viridia, inflorescentia breviora, viva acute canaliculata, sicca subplana, scabrida, longe attenuata, longe vaginantes; vaginae superne scabridae. *Inflorescentia* anguste paniculata, interrupta; *paniculae secundariae* 8–10, inferioribus 1–2 interdum exceptis binae, subpyramidales, sublaxae, inferiores distantes, inaequaliter longe exserte

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\* Continued from K.B. 1940, 137.

pedunculatae, superiores subapproximatae, incluse breviter vel brevissime pedunculatae; pedunculi stricti, scabridi. *Rhachis* pubescens, angulis hispidula; ramuli demum oblique vel horizontaliter divaricati, inferiores plerumque 1-3- sed usque 6-stachyi, superiores 1-stachyi. *Bracteae* foliaceae, inferiores longe vaginantes, inflorescentiam sub anthesin longe superantes, inflorescentiam statu fructifero subaequantes, superiores breviter vel vix vaginantes; vaginae superne scabrido-pubescentes. *Spicae* androgynaeceae (pars mascula parte feminea multo brevior), 1-1.5 cm. longae, subdensiflorae; bracteolae scabrido-aristatae, marginibus hispidulae. *Squamae* ovatae, acutae, hispidulo-pubescentes, pallide ferrugineo-virides, carinatae, scabrido-aristatae. *Utriculi* 5 mm. longi, squamis plerumque aequilongi, elliptico-obovati, oblique patentes, superne dense hispidulo-pubescentes, valde plurinerves, trigoni, pallide ferrugineo-virides, in rostrum longum subcylindricum brunneum hispidulo-pubescent ore bidentatum subabrupte contracti. *Stigmata* 3.

NORTHERN RHODESIA: Mwinilunga District; just south of Matonchi Farm in *Brachystegia* woodland, 18 February 1938, *Milne-Redhead* 3686A (type); 15 December 1937, *Milne-Redhead* 3686.

***Carex macrophyllidion* Nelmes, sp. nov.**; affinis *C. spicato-paniculatae* C. B. Clarke, sed foliis angustioribus, rhachibus inflorescentiarum angulis solum hirtis, paniculis secundariis laxioribus, squamis pallidioribus, utriculis ellipticis glabris haud subabrupte rostratis, praecipue differt.

*Rhizoma* lignosum, caespitosum. *Culmi* circiter 60 cm. alti, subteretes, laeves, foliati. *Folia* 3-5.5 mm. lata, superiores inflorescentiam superantes, viva alte canaliculata, saturate viridia, sicca subplana, virescentia, longe attenuata, scabrida, longe vaginantes; vaginae laeves. *Inflorescentia* paniculata, interrupta; *paniculae secundariae* 5-6, inferiores singulae, superiores binae, subpyramidales, inferiores distantes, longe vel longissime exserte pedunculatae; superiores approximatae, brevius inaequaliter exserte pedunculatae; pedunculi stricti, laeviusculi. *Rhachis* angulis hispidulis exceptis glabra; ramuli demum divaricati, plerumque 1-stachyi. *Bracteae* foliaceae, inflorescentiam longe superantes, superiores angustissime, brevissime vel vix vaginantes, inferiores longe vaginantes; vaginae laeves. *Spicae* androgynaeceae (pars mascula parte feminea brevior), 7-10 mm. longae, subdensiflorae; bracteolae longe aristatae, marginibus hispidulae. *Squamae* late ovato-lanceolatae, acutae, glabrae, plurinerves, pallide viridulo-brunneae, marginibus anguste albo-hyalinae, carinatae, scabrido-aristatae. *Utriculi* 5.5-6 mm. longi, oblique patentes, plerumque squamis longiores sed interdum iis aequilongi, elliptici, trigoni, plurinerves, glabri, subinflati, brevissime valde stipitati, in rostrum longum latum marginibus parce hispidulum ore alte bidentatum subsensim desinentes. *Stigmata* 3.

ANGOLA: District of Moxico; by R. Mfumbu, in *Brachystegia* woodland, 7 January 1938, *Milne-Redhead* 3971 (type).

NORTHERN RHODESIA: Mwinilunga District; south of Matonchi Farm in *Brachystegia* woodland, 6 December 1937, *Milne-Redhead* 3511, 3684.

For reasons similar to those given above for choosing the lectotype of *C. spicato-paniculata*, it is here proposed to choose that of *C. nyasensis* C. B. Clarke.

This species was first described in Fl. Trop. Afr. 8, 519 (1902). No type was indicated, but five gatherings were cited, all from Nyasaland, three collected by Whyte and two by Buchanan. The best material is that collected by Whyte on the Plains of Zomba, probably in 1896, and I accordingly make this the lectotype of the name. All the gatherings, except that of Whyte from N. Nyasaland, 1896, which is at least varietally distinct, appear to represent one species.

**Carex angolensis** Nelmes, sp. nov; affinis *C. nyasensi* C. B. Clarke, sed paniculis secundariis magis pyramidalibus et distantibus, spicarum parte mascula brevior, squamis pallidioribus cum utriculis interdum superne hispidulis, utriculis subabrupte rostratis, rostris planioribus differt.

*Rhizoma* lignosum, breve. *Culmi* 100–125 cm. alti, obtuse trigoni, laeves, foliati. *Folia* 5–8 mm. lata, inflorescentia paullo breviora, viva alte canaliculata, laete viridia, sicca subplana, brunnescentia, longe attenuata, superne scabrida, culmos longe vaginantia; vaginae laeves. *Inflorescentia* paniculata, valde interrupta; *paniculae secundariae* 6–8, superioribus 1–3 interdum exceptis singulae, subpyramidales, sublaxae, inferiores distantes vel remotae, longe vel longissime exserte pedunculatae, superiores subapproximatae, breviter vel brevissime incluse pedunculatae; pedunculi stricti, scabridi. *Rhachis* pubescens, angulis hispidula; ramuli demum divaricati, inferiores usque 3-stachyi, superiores 1-stachyi. *Bracteae* foliaceae, inflorescentiam plerumque longe superantes, inferiores longe vel longissime vaginantes, superiores breviter vel vix vaginantes; vaginae laeves. *Spicae* androgynaeceae (pars mascula brevissima), 7–13 mm. longae, subdensiflorae; bracteolae scabrido-aristatae, marginibus hispidulae. *Squamae* ovatae, acutae, glabriusculae vel interdum superne pubescentes, tenues, plurinerves, pallidae, aristatae; aristae hispidulo-pubescentes. *Utriculi* 4 mm. longi, oblique patentes, squamis plerumque distincte longiores latioresque, trigoni, obovati vel obovato-elliptici, valde plurinerves, inferne glabri, interdum superne nervis parce hispiduli, in rostrum mediocre latum marginibus hispidulum ore alte bidentatum subabrupte contracti. *Stigmata* 3.

ANGOLA: District of Moxico; between R. Monu and R. Kampashi, in *Brachystegia* woodland, on sand, 19 January 1938, *Milne-Redhead* 4222.

## XXI—THE TYPE OF CORYMBIUM AFRICANUM L. T. A. SPRAGUE.

The following investigation was undertaken in response to a request received from Mrs. M. R. Levyns of Cape Town, in connexion with the Flora of the Cape Peninsula now in course of preparation. The genus *Corymbium* has recently been revised by Miss E. I. Markötter\*, who has applied the name *Corymbium africanum* L. to *C. glabrum* L. (*C. nervosum* Thunb.). Miss Markötter's argument may be summed up as follows :

I. *Corymbium africanum* L. (1753) comprised two species now recognized as distinct, namely 1, *C. scabridum* Berg., 1767 (*C. scabrum* L., 1767), and 2, *C. glabrum* L., 1767 (*C. nervosum* Thunb., 1794).

II. Bergius in 1767 based *Corymbium scabridum* Berg., on the first two synonyms of *C. africanum* cited by Linnaeus (Sp. Pl. ed. 1, 928), namely, on *Corymbium foliis ad radicem longissimis liratis* Burm. Afr. 189, t. 70, f.1, and *Bupleurifolia, semine papposo, valerianoides umbellata cauliculo scabro* Pluk. Alm. 73, t. 272, f.5.

III. Linnaeus later in 1767 segregated *C. scabrum* L., which was likewise based on the first two synonyms of *C. africanum* L. (1753). He observed that these synonyms should be excluded from *C. africanum*.

IV. The name *C. africanum* L. must accordingly be restricted to its remaining element, namely, to *Bupleuri similis planta aethiopica, ad caulium nodos tomentosa* Pluk. Alm. 73, t. 272, f.4.

It will be observed that this argument is based on the so-called "method of residue," that is, it rests on the assumption that, when a taxonomic group is divided into two or more groups of the same rank, its name must be retained for *what is left* after segregation of the newly named groups. Such a method of applying names was frequently followed *before* the formal introduction of the type-method into the International Rules in 1930, but is now rejected: under Art. 18, "the application of names of taxonomic groups is determined by means of *nomenclatural types*." The question to be decided is accordingly: What is the type of *Corymbium africanum* L. Sp. Pl. ed. 1, 928 (1753) ?

The text of *C. africanum* L. in Sp. Pl. ed. 1 is as follows :  
*africanum*. 1. CORYMBIUM. Hort. Cliff. 494.

*Corymbium foliis ad radicem longissimis liratis*  
*Burm. afr.* 189, t. 70. f.1 *Bupleurifolia, semine papposo,*  
*valerianoides umbellata, cauliculo scabro. Pluk.*  
*alm.* 73. t. 272, f.5.

*Bupleuri similis planta aethiopica, ad caulium nodos*  
*tomentosa. Pluk. alm.* 73. t. 272, f.4.

*Habitat in Aethiopia.*

It should be noted that *Corymbium africanum* was a binary name for the species named *Corymbium* in Hort. Cliff. Linnaeus

\* Engl. Bot. Jahrb. 70, 354-372 (1939).



did not describe *C. africanum* in Sp. Pl. ed. 1 : no diagnostic phrase was required for the species, since he regarded the genus *Corymbium* as monotypic. He referred, however, to the specific description supplied by him in Hort. Cliff. 494 (1737). The account of *Corymbium* there given is as follows :

CORYMBIUM *cor.* g. 976.

1. CORYMBIUM

*Bupleurifolia* semine papposo Valerianoides umbellata, cauliculo scabro. *Pluk. alm.* 73. t. 272, f.5.

α. *Bupleuri similis* planta aethiopica, ad caulium nodos tomentosa. *Pluk. alm.* 73. t. 272, f.4.

*Crescit in Aethiopia.*

*Radix coronatur lana seu capillis longis inque tophum congestis. Folia radicalia copiosissima, linearia, margine involuta, hinc subulato-setacea, spithamaea vel pedalia. Caulis pedalis, teres, erectus, purpurascens, scaber, instructus foliis aliquot alternis, lanceolatis, amplexicaulibus, e quorum alis superioribus racemi compositi, qui omnes fastigiati in corymbum flores ferunt.*

It will be observed that Linnaeus distinguished typical *Corymbium* and a variety α. The former was based on two elements : (1) *Bupleurifolia etc.* *Pluk. t.* 272, f.5, and (2) a specimen in the Clifford herbarium, from which he had prepared the description given at the end of his account. There is no dispute that the specimen in the Clifford herbarium is conspecific with *C. scabridum* Berg. (1763), that the description refers to *C. scabridum*, and that Plukenet's t.272, f.5 represents *C. scabridum*. Typical *Corymbium* L. Hort. Cliff. (1737) is accordingly entirely conspecific with *C. scabridum* Berg. The variety α, based on Plukenet's t.272, f.4, is conspecific with *C. glabrum* L.

Since the binary name *Corymbium africanum* L. (1753) was based on *Corymbium* Hort. Cliff., it has the same type, and must accordingly be applied to *C. scabridum* Berg.

Comparison of the accounts of *Corymbium* Hort. Cliff. 494 and *C. africanum* Sp. Pl. ed. 1, 928, reveals two differences :

(1) Linnaeus introduced an additional synonym in 1753, namely, *Corymbium foliis ad radicem longissimis liratis* Burm. Afr. 189, t. 70, fig. 1. He inserted this immediately after the reference to Hort. Cliff., that is, *before* those to Plukenet's figures. Burmann's figure represents *C. scabridum* Berg.

(2) Linnaeus in 1753 no longer distinguished *Corymbium* var. α of Hort. Cliff. as a variety : he cited *Bupleuri similis planta aethiopica, ad caulium nodos tomentosa* *Pluk. Alm.* 73, t. 272, fig. 4, as a direct synonym of *C. africanum*.

The fact that Linnaeus in 1753 no longer distinguished the var. α of Hort. Cliff. as a variety does not mean that he had ceased to regard the strigose-stemmed plant as typical of the species. Indeed, his insertion of the Burman reference *before* the Plukenet's references suggests that he regarded it as a better representation of *C.*

*africanum*. A further reason, if any were required, for regarding the type of *Corymbium* Hort. Cliff. (1737) as being the type also of *Corymbium africanum* Sp. Pl. ed. 1 (1753), is that Linnaeus had up to the latter date seen no further material which might have led to a re-orientation of his concept of the species. There is no specimen named *Corymbium africanum* in his herbarium—vide B. D. Jackson, Index Linn. Herb. 63 (1912).

Since the publication of a name is validated by the provision of a description, or by a reference to a former description, the specimen on which the description was based is—*ceteribus paribus*—the type of the name. It follows that the specimen in the Clifford herbarium is the type of *C. africanum* L. Sp. Pl. ed. 1, 928 (1753). No subsequent action, whether by Linnaeus himself or by any other botanist, can affect this conclusion. The name *Corymbium africanum* L. should accordingly be applied to *C. scabridum* Berg.

Up to 1763 Linnaeus seems to have made no modification in his concept of *C. africanum* (1753): the account of that species in Sp. Pl. ed. 2, 1317 (1763) is the same as that in ed. 1, except for a printer's error in the reference to *Bupleuri similis* etc. Pluk., where "f. 4, 5" appears instead of "f.4." By 1765, however, Linnaeus had come to the conclusion that his *C. africanum* of 1753 included two distinct species, one with scabrid stems (Pluk. f.5), and the other with smooth stems and broader leaves, bearded in the axil. In a letter to J. and N. L. Burman, dated 8th January 1765, dealing with a collection of Cape plants which they had sent him, he referred to a specimen of *Corymbium*, bearing the number "2," and asked them to look among their plants to see if there were another, distinct species, with broader leaves, bearded from the axil, and a smooth stem: "Quaere inter tuas nunne et alia distincta species detur foliis latoribus ex ala barbatis, caule laevi" (H. C. van Hall, Epist. Ined. Caroli Linnaei, 84:1830). At that date Linnaeus apparently regarded the scabrid-stemmed plant [*C. scabridum* Berg.] as typical *C. africanum* and the smooth-stemmed barbate plant [*C. glabrum* L.] as a distinct new species. In his 'Mantissa prima,' (Oct. 1767) Linnaeus segregated the scabrid-stemmed plant under the new name *Corymbium scabrum* L., with the diagnostic phrase "*Corymbium* caule scabro," appending the observation that the relevant synonyms from Burman and Plukenet should be excluded from *Corymbium africanum*. This suggests that Linnaeus intended, at the time of writing, to reserve the name *Corymbium africanum* for the smooth-stemmed plant. But in his 'Systema Naturae,' ed. 12, 2, 582, also published in Oct. 1767, he proposed the name *Corymbium glabrum* L. for the smooth-stemmed plant. As in other instances, he abandoned the original name of the species (*C. africanum*), proposing new names for each of the segregates. It may be noted that, apart from the fact that many page-numbers of the 'Mantissa' \* are cited in the "Systema," ed. 12, vol. 2, there is

\* E.g. pp. 24, 66, 121, 136 of the "Mantissa" are cited on pp. 56, 272, 591 and 720 of Syst. Nat. ed. 12, vol. 2.

nothing to suggest that the 'Mantissa' appeared first. Indeed, it seems probable that they were issued together, since the last page of the *Systema*, vol. 2, has the letters "MAN-" near the bottom, an indication that the *next page* began with those letters. According to Richter, *Codex Botanicus Linnaeanus*, p. xxxi, both works appeared in October 1767.

The name *Corymbium scabridum* Berg. had been published by Bergius, *Descr. Pl. Cap.* 341 (Sept. 1767) for the scabrid-stemmed species. Miss Markötter states that Bergius described *C. scabridum* as a *new species*. Actually it was a *new name* for an old species, viz., for *Corymbium* L. Hort. Cliff. 494, which Bergius cited as a synonym, and ipso facto a new name for *C. africanum* L. (quoad typum).

#### CONCLUSIONS.

1. The type of *Corymbium africanum* L. (1753) is the type-specimen of *Corymbium* L. Hort. Cliff. 494.
2. *C. africanum* L. (1753) is conspecific with and antedates *C. scabridum* Berg. (1767).
3. The following changes in the nomenclature adopted in Miss Markötter's revision are accordingly required.

A : *Corymbium* no. 3, *C. scabridum* Berg., becomes *C. africanum* L. (1753).

B : *Corymbium* no. 11, *C. africanum* L. sec. Markötter (non L. 1753 quoad typum), becomes *C. glabrum* L. (1767).

#### XXII—MISCELLANEOUS NOTES.

"Cotine" or "Erbifex."—In the daily press some 10–11 years ago there were frequent references to a new natural fibre called "Cotine" or "Erbifex," *Asclepias incarnata* L., and Kew received numerous enquiries as to its commercial possibilities, about which somewhat extravagant claims were put forward by company-promoting concerns. The species is a native of North America where it is known as "American Swamp Milkweed," and commercial production was attempted in Britain but without success.

It had long been known that this species yielded a fibre and suggestions for its utilization were made in the United States in the latter part of last century. An interesting document has now been received at Kew, however, which shows that the fibrous qualities of the species were known as early as 1815. In a deed drawn up by Charles Whitlow,\* Botanist, of the New York Coffee House, Sweetings Alley, Middlesex, addressed to His Most Excellent Majesty King George the Third, we learn that he "should and lawfully might make use exercise and vend within England Wales

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\* Charles Whitlaw (sometimes spelled Whitlow), author of "Whitlows New Medical Discoveries, with a defence of the Linnean Doctrine and a translation of his Vegetable Materia Medica, which now appears in an English Dress," London, 1829.

and the Town of Berwick upon Tweed my Invention of The Working or making of certain Manufactures from certain Plants of the Genus *Urtica* and *Esclapius* growing in North America and not heretofore used in this Realm whereby the fabricated products usually had made or obtained from Hemp, Flax, Cotton, Silk and other the like fibrous Materials or the Seeds or the parts thereof may be beneficially had made or obtained In which said Letters Patent there is contained a Proviso obliging me the said Charles Whitlow by an Instrument in writing under my hand and seal to cause a particular description of the nature of my said Invention and in what manner the same is to be performed to be Inrolled in His Majesty's High Court of Chancery within six calendar months after the date of the said recited Letters Patent as in and by the same (relation being thereunto had) may more fully and at large appear Now Know Ye that in compliance with the said Proviso I the said Charles Whitlow do hereby declare that the nature of my said Invention and manner of performing the same are particularly described and ascertained in manner following, that is to say—I do take use and manufacture for the purpose aforesaid certain Plants not before worked or manufactured in Great Britain which have been first worked and used by me in Great Britain and of which Plants I do give the Botanical description in the usual words or terms of Art in the Latin language as here follows.....”

Three species of *Urtica* are first described and then the *Asclepias* in the following terms :—“*Asclepias incarnata* Linneus *Asclepias pulchra* Ehrhart et undique pubescens foliis approximatis oblongis acutis basi obtusis, brevissime petiolatis, umbellis aggregatis origine geminis corniculis appendicum subexsertis. obs. Radix crassa carnosa similis tuberosa.”

English translations of the descriptions follow, the document being witnessed and sealed by a magistrate, and a five pound stamp affixed.

Kew is indebted to the honorary secretary of the British Records Association for this interesting document which has been placed in the Museum files.

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**Vegetative Propagation of Tropical Crops.\***—This publication is complementary to that published in 1936 by the Imperial Bureau of Fruit Production (as it was then styled), which dealt with the vegetative propagation of a large variety of fruits grown in the Tropics and Sub-Tropics. The demand experienced for this memoir has led the same authors to compile the present volume, and there is every reason to suppose that it will meet with a similar response from workers in the tropics.

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\* “Vegetative Propagation of Tropical and Sub-tropical Plantation Crops,” by G. St. Clair Feilden and R. J. Garner. Technical Communication No. 13 of the Imperial Bureau of Horticulture and Plantation Crops, East Malling, Kent, England, 1940. Pp. 99. Price 3/6.

The work includes a description of a large number of plantation crops, many of which, such as sugar cane, rubber, coffee, cacao, and sisal, are already of great economic importance, whilst others have at present a limited use which may extend when their values are more properly appreciated in the world of commerce. No mention is made of the cashew nut which now commands a considerable market, and other varieties are now beginning to attract the attention of the planter, so that it will undoubtedly be necessary to bring the volume up to date in a few years time.

One is glad to see that the section of the previous publication which dealt with the methods of vegetative propagation has not only been retained but has been considerably enlarged and that the descriptions are now supported by delightfully simple and clear line drawings. The mention of the use of loosely woven baskets as a substitute for pots or bamboo sections in nursery work in the tropics is also well illustrated, and is deservedly included as this method now has an increasing vogue.

The authors are to be congratulated on having succeeded in bringing together much invaluable information in a compact form, and the volume should prove extremely useful to those engaged in the cultivation of tropical crops.

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**Botanical Magazine.**—Part 4 of vol. 162 which was published on 22nd April contains the following plant portraits :

*Iris Wattii* Baker (t.9590), Assam and Yunnan; *Camellia Sasanqua* Thunberg (t.9591), southern Japan; *Tritonia flavida* Schlechter (t.9592), Natal; *Primula amoena* M. Bieberstein (t.9593), Caucasus and N.E. Turkey; *Paeonia Clusii* F. C. Stern (t.9594) a new name for a species native of Crete; *Aeschynanthus mimetes* B. L. Burtt (t.9595), a new species, Assam to S.W. Yunnan; *Aristolochia Lindneri* Berger (t.9596), Bolivia; *Rhododendron exquisitum* Hutchinson (t.9597), S.W. Szechwan; *Cyananthus microphyllus* Edgeworth (t.9598), Nepal and N. India; *Viola Stojanowii* W. Becker var. *latifolia* Turrill (t.9599), a new variety, Bulgaria; and *Abies lasiocarpa* (Hook.) Nuttall (t.9600), North America.

The volume is dedicated to Captain Frank Kingdon Ward in recognition of his services to Botany, Horticulture and Geography.

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# BULLETIN OF MISCELLANEOUS INFORMATION No. 5 1940 ROYAL BOTANIC GARDENS, KEW

## XXIII—SOME FISH-POISON PLANTS AND THEIR INSECTICIDAL PROPERTIES.

F. TATTERSFIELD,\* J. T. MARTIN\* and F. N. HOWES.

The well-known insecticidal powers of the fish-poisoning plants belonging to the genera *Derris* and *Lonchocarpus*, now extensively used, have stimulated the search for others in many parts of the world, partly with the object of establishing local industries or of finding local means for the control of insect pests. Periodically such plants have been sent to this country for identification or for the assessment of their insecticidal properties. On other occasions plants have been sent by request, either because they were closely related botanically to the better-known species mentioned, or because it was desirable to have information on specific points, such as the effect of varietal differences or age on insecticidal potency.

None of the plants described in this paper possesses the same insecticidal power as the roots of recent selections of *Derris* and *Lonchocarpus*, yet it may be useful to give a brief account of their distribution, main botanical characteristics and their value as contact insecticides, more especially as, in some cases, the part of the plant used is more readily harvested than the root. There is also the possibility that more potent strains or varieties will be discovered or produced by plant breeding or selection.

The plants examined were:—*Barringtonia racemosa* Roxb., from Kenya (below); *B. asiatica* Kurz, from Arnhem Land, North Australia (p. 170); *Barringtonia* sp., from British Solomon Islands (p. 171); *Careya australis* F. Muell., from Arnhem Land, North Australia (p. 171); *Derris trifoliata* Lour., from British Solomon Islands (p. 171); *Dioscorea* sp. ("Tuba sakut"), from North Borneo (p. 173); *Dolichos pseudopachyrhizus* Harms, from Kenya (p. 174); *Ipomoea* sp., from Santa Isabella, British Solomon Islands (p. 175); *Jacquinia* sp., from Guayaquil (p. 175); *Millettia pachycarpa* Benth., from India (p. 175); *Ostryoderris gabonica* Dunn, from Belgian Congo (p. 176); *Tephrosia macropoda* (E. Meyer) Harv., from Natal (p. 177); *T. Vogelii* Hook. f., from Uganda (p. 178); *Tephrosia* sp. from Arnhem Land, North Australia (p. 180).

### *Barringtonia racemosa* Roxb.

The genus *Barringtonia* consists of about three dozen species, many of them common trees in mangrove swamps. A few are to

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be found in East Africa and others in the tropics of Asia, Australia and Polynesia. Most of them contain saponin and it is this that may account for their use as fish-poisons and in native medicine.

*Barringtonia racemosa* is a medium-sized evergreen tree widely distributed in the warmer areas bordering the Indian Ocean. The fruits are reputed to be used for poisoning wild pigs in the Philippines. Some of the more primitive tribes in Malaya are said to pound the seeds and extract the starch for food, after pouring off the liquor which no doubt carries away deleterious substances. In India the root has medicinal uses. The bark is fibrous and rich in tannin.

*Insecticidal properties.*—The bark has been reported to have insecticidal properties. V. A. Beckley (*in litt.* to one of us) states that the natives of Kenya use it successfully as a fish-poison and that weak alcoholic extracts showed a fair toxicity to insects. R. R. le G. Worsley (Insecticidal properties of some East African Plants, in *Ann. Appl. Biol.* **21**, 658 : 1934) found that alcoholic and cold and warm aqueous extracts were completely toxic to *Citrus aphid* (probably *Toxoptera aurantii* Boy.) at concentrations representing 2–2.5% of the bark and also that the resin fraction contained the bulk of the toxic principles. A sample of the bark kindly sent to Rothamsted by Mr. Beckley showed no toxicity to *Aphis rumicis* when alcoholic extracts equivalent to 2% of the bark were tested. This sample may have lost its activity in transit, but it does not in any case seem probable that *B. racemosa* would replace the much more potent insecticides of the derris class.

### ***Barringtonia asiatica* Kurz (syn. *B. speciosa* Forst.)**

This species is also a medium-sized evergreen tree and is usually found near the sea. It has much the same distribution in tropical Asia and Polynesia, and has been recorded from various parts of northern Australia and Queensland. The tree normally occurs on open sandy beaches.

Both the fruit and the bark of this species are commonly used as fish-poisons. In the Philippines it is well known and the following description is given of the method of using it there—"A sufficient quantity of the bark, preferably taken from a mature tree, is cut into small pieces, which are then comminuted and mixed with earth in a wooden mortar. The proportion is about one part of earth to three parts of bark. The quantity of bark to be used depends upon the size of pond to be poisoned. The mixture is put in a gunny sack; a half-sack full has been found by experience to be sufficiently strong to kill fish in a pond of about a metre deep and eight metres in diameter. The time of application of the fish-poison has been found to be most satisfactory at early dawn; then by six or seven o'clock in the morning the stunned fish may be collected from the pool thus treated (The Philippine Agriculturist, **21**, 29 : 1932).

A sample of the bark of *Barringtonia asiatica* collected by Dr. Donald F. Thompson in Arnhem Land, Northern Territory, Australia, showed only a slight insecticidal potency when an alcoholic extract was tested at a concentration of 1% in terms of the bark.

Specimens of the seeds and husks, probably of a species of *Barringtonia* from the British Solomon Islands, also showed no toxicity to *Aphis rumicis*. Mr. Pagden, from whom this sample was received, reports (*in litt.*) that the fresh seed, ground with coral sand, is placed in a small bag and used for killing fish in rock or mud holes, the bag being squeezed to expel a little of the latex.

### **Careya australis F. Muell.**

This Australian tree may attain to a large size but does not exceed 10 or even 5 metres in height in some localities. It occurs in the warmer or northern part of the Continent and has been recorded from various parts of Queensland near the coast and in Eucalyptus forest, in areas surrounding the Gulf of Carpentaria, in Arnhem Land, and some of the northern coastal districts of Western Australia.

Apparently the tree was well known to the aborigines and put to various uses by them. The pear-shaped fruit with its seeds was eaten when ripe (roasted) and cordage made from the fibrous bark, which was also used as a fish-poison. The pulped leaves were used medicinally for treating ulcers (F. M. Bailey, Queensland Flora).

We are indebted to Dr. Donald F. Thompson for samples of the bark of both branches and root of *Careya australis* from Arnhem Land, Northern Territory, Australia. Alcoholic extracts did not prove toxic to *Aphis rumicis* at a concentration of 1% in terms of the part of the plant. Hence this material is not likely to prove of interest as a contact insecticide.

### **Derris trifoliata Lour. (syn. *D. uliginosa* Benth.).**

This species of *Derris* probably has a wider range of distribution than any other member of the genus. It occurs in India, Ceylon, Malaya, Indo-China, S. China, the Philippines, Polynesia, northern Australia, Madagascar and East Africa. It is usually found near the sea shore and on the banks of tidal rivers near mangrove swamps. It also occurs inland.

This has long been known as a common native fish-poison in many areas, particularly in northern Australia and many parts of Polynesia and the Pacific Islands. In India it is reputed to be used medicinally to some extent—as a stimulant, antispasmodic and counter-irritant. Rough cordage may be made from the tough stems of the plant.

*Insecticidal properties.* *D. trifoliata (uliginosa)* has been reported on several occasions to have insecticidal properties. Of six species tested by N. E. McIndoo, A. F. Sievers and W. S. Abbott (*Derris* as an Insecticide, in Jour. Agric. Res. 17, 177 : 1919), only *D.*



*elliptica* and *D. trifoliata* were found satisfactory insecticides. E. R. De Ong (The comparative insecticidal value of different species of *Derris*, in Jour. Econ. Ent. 23, 619 : 1930) found the roots of this plant not only aphicidal but to be partially deterrent to the caterpillar *Euphydras chalcedona*. Samples of leaf, branch and root tested at Rothamsted in 1927 showed, however, little or no promise as insecticides. A three year old sample of the root grown in Malaya was reported by J. N. Milsum (*Derris uliginosa*, in Malay. Agric. Jour. 26, 18 : 1938) to contain 5.0% ether extractives and 0.47% rotenone and thus to be of doubtful commercial value.

In 1934 samples of several plants collected in the British Solomon Islands were received at Rothamsted from Mr. H. T. Pagden. Three were *Derris* samples, recognised by the Government Botanist, Brisbane, as *D. trifoliata* Lour., and were specified as from Savo (root, stem), Gizo (root), and Tulagi (root). In addition, the stems and leaves of an unrecognised vine from Savo were received (it was later described by the Government Botanist, Brisbane, as indistinguishable from *D. trifoliata*). Mr. Pagden (*in litt.*) reports that the vine is used by the natives both in fresh and salt water for catching fish. The fresh leaves and stems after being ground up with coral sand are dropped in among a shoal of fish, when the majority are killed almost immediately.

Alcoholic extracts of the Savo root at concentrations (in terms of part of plant) of 1.0% gave a moribund and dead figure of 40%, the Savo stem at 2 and 1% concentrations 80 and 40% respectively, the Gizo root at 1% concentration 70%, while the Tulagi root showed no toxicity at or below 1%. They can thus be regarded as of little practical interest as contact insecticides.

The leaf and stem of the "vine" proved distinctly more toxic to *Aphis rumicis*. A series of tests carried out on three separate occasions within three weeks gave the figures shown in Table I. A relatively poor sample of *D. elliptica* root, tested on one of these occasions, is included for comparison. It contained 1.4% of rotenone and 6.8% of ether extractives.

TABLE I.

Toxicity to *Aphis rumicis* of a Vine from the British Solomon Islands.

Description.		% Concentration in terms of part of plant.			% Moribund and dead insects after 2 days.	
Vine—stem	...	...	2.0	...	...	100
			1.0	...	...	90
			0.75	...	...	50
			0.5	...	...	20
leaf	...	...	1.0	...	...	100
			0.75	...	...	100
			0.5	...	...	100
			0.25	...	...	65
			0.1	...	...	30

Description.	% Concentration in terms of part of plant.			% Moribund and dead insects after 2 days.		
<i>Derris elliptica</i> —root	...	0.14	...	...	100	
		0.11	...	...	98	
		0.09	...	...	87	
		0.07	...	...	82	
		0.05	...	...	44	
		0.035	...	...	14	
Controls	...	...	...	—	...	3

The vine clearly does not possess the same degree of insecticidal potency as the sample of *D. elliptica*.

Further samples received in 1935 confirmed that the leaf of the vine was more toxic than root or stem, but not to be of the same order of potency as the roots of *D. elliptica* now available.

In 1936 a specimen of derris root was received from Vella Island, British Solomon Islands, collected by Mr. R. A. Lever and said to be a very potent fish-poison. The natives use stems, leaves and roots for fishing in the sea. The root was completely toxic at a concentration of 1% and accounted for 73% of the insects at 0.5%. The whole series of results obtained with *D. trifoliata*, although indicating that there are strains or physiological races of different potencies, do not show this species to be capable of commercial exploitation in competition with either *D. elliptica*, *D. malaccensis* or certain species of *Lonchocarpus*. The fact, however, that a vine of rather indefinite botanical description but apparently *D. trifoliata* possesses leaves and stems showing toxicity to insects is of considerable interest.

### **Dioscorea sp.**

*Dioscorea piscatorum* Prain & Burkill is a large climber found in Malaya, Sumatra and Borneo. The tubers, which are near the surface and sometimes protected by thorns, are red in colour and well known to the Malays as a fish-poison, being called by them "tuba ubi." The Sahai in Malaya are said to eat the tubers after roasting, the toxic or deleterious substances being destroyed by heat (I. H. Burkill, A Dictionary of the Economic Products of the Malay Peninsula).

*Insecticidal properties.* A sample of the tuber of "Tuba sakut." provisionally identified as *Dioscorea flabellifolia* or *D. piscatorum*, was received at Rothamsted in 1933 from the Imperial Institute. It was sent from North Borneo to the Imperial Institute and was reported as a more potent fish-poison than many species of *Derris*. Alcoholic and aqueous extracts showed only a very slight insecticidal action, but the expressed sap itself showed rather more potency, but not to such an extent as to warrant an extended investigation.

### ***Dolichos pseudopachyrhizus* Harms.**

The genus *Dolichos* is well represented throughout Africa and there are several species which possess fleshy or tuberous rootstocks. These are edible in some instances and used by the natives as food. The above species is of special interest on account of the large dimensions the rootstock sometimes attains, for it may reach 20-25 cm. in diameter and weigh 20-30 lbs. or more. It is not edible.

The plant has a wide distribution in the warmer parts of Africa and there is little doubt that several distinct geographical forms or varieties of it exist. It occurs generally in open savannah or slightly wooded country, and sometimes in tall grass.

Several separate climbing or scandent stems may arise from each tuber. These trail over trees or rocks extending sometimes as much as 12 metres.

The rootstock may be somewhat corrugated externally and is covered with a thick laminated brown bark which no doubt affords good protection under desiccating conditions. It contains much fibrous tissue when mature. Various writers and collectors have referred to the alleged poisonous nature of the tubers and their use by natives in poisoning fish. Broun and Massey (Flora of the Sudan, 203) state that "both the tubers and the beans contain a poisonous resin which is an active fish poison" and that "in the Bahr El Ghazal the tuber is mixed with the sap of the 'Heglig' (*Balanites aegyptiaca*) and used as a substitute for soap."

The present sample of root was examined anatomically at Kew (by Dr. C. R. Metcalfe) and compared with another sample of root from the dry coastal area of Kenya, alleged to be *Dolichos pseudopachyrhizus*. The two specimens were found to be similar in general characters, but there were small differences, notably in the structure of a portion of the starch grains and in the presence or absence of crystals, suggesting that the two specimens may have originated from different forms of the plant—or even from different species.

*Insecticidal properties.*—The sample was received at Rothamsted in August 1936, from Mr. E. W. Bovill, and was derived from Taveta, from the Kenya side of the Kenya-Tanganyika frontier, near Mount Kilimanjaro. It is reported that the natives boil the bulbous root and use the resultant fluid for the removal of ticks, etc., from sheep and goats. It is also reported that a little rotenone has been found, but whether the term is used in a general sense for a rotenone-like substance is not known.

The root was received in an undried state. A portion of it was dried at about 35°C. and alcoholic extracts made of both the dried and undried material. The toxicities of the extracts were determined in threefold replication using *Aphis rumicis* as a test subject. The extracts of undried root showed very little insecticidal action at concentrations of 2% or below, probably owing to the large amount

of moisture present. The results for the dried root were as follows :—

Concentration in terms of root.	% of insects paralysed.
1.0 ...	100
0.5 ...	83.2
0.25 ...	17.2
Controls—Alcohol 10%	
Saponin 0.5% ...	6.9

These results, while showing a definite insecticidal effect, demonstrate that this root is not of commercial interest, but that it might have some value for local use.

### ***Ipomoea* sp.**

A sample of the tubers of a species of *Ipomoea* was received from Santa Isabella, British Solomon Islands, through the Imperial Institute. The tubers contained much sap. Alcoholic extracts were not toxic to *Aphis rumicis*.

### ***Jacquinia* sp.**

*Jacquinia Sprucei* Mez (*Myrsinaceae*) occurs as a low bushy tree in Guayaquil in Ecuador. Several observers, including Robert Spruce, have recorded the use of the small orange-like fruits in Ecuador for stupefying fish.

The fruits of what was considered at Kew to be a species of *Jacquinia*, probably *J. Sprucei* Mez, and derived from Guayaquil, being known there as "Barbasco" and used as a fish-poison, were without toxicity to *Aphis rumicis*.

### ***Millettia pachycarpa* Benth.**

Over 60 species of *Millettia* have been recorded from different parts of India.

*Millettia pachycarpa*, a strong-growing woody climber, might easily be mistaken for a species of *Derris* when not in flower or fruit, for its vegetative characters and general appearance are very similar. Like *Derris* it is well known as a fish-poison plant and is commonly employed by natives to procure fish from the hill streams and pools in regions where it grows. According to Brandis (*Indian Trees*, 219 : 1906) the fruit of this species is used for intoxicating fish besides the milky juice of the root. An allied Indian species which is also used as a fish-poison is *Millettia auriculata* Baker.

*Insecticidal properties.*—The genus *Millettia* contains several species with insecticidal properties. K. Nagai (*Journ. Tokyo Chem. Soc.* **23**, 744 : 1902) isolated rotenone as one of the constituents of *M. taiwaniana*. T. Kariyone, K. Atsumi and M. Shimida (*Journ. Pharm. Soc. Japan*, No. 500, 739 : 1923) confirmed this result and showed that this compound was common both to this plant and to *D. elliptica*. It was due to this work that the name "rotenone" replaced all others for the chief active principle of the fish-poison

insecticides of *Derris* and *Lonchocarpus* species. The root of *M. auriculata* is stated by N. E. McIndoo and A. F. Sievers on the authority of Greshoff (1913), to be used as an insecticide. (Plants tested for or reported to possess insecticidal properties, in Dept. Agr. U.S., Bull. no. 1201, 44 : 1924.) Chin Pi Chen (Science (China), **19**, 1405 : 1935, and Chem. Absts. **30**, no. 1, 225 : 1936) reported *M. pachycarpa* to be both a contact and stomach poison to insects, to contain much saponin and possibly rotenone. It is listed as an Indian fish-poison by M. B. Raizada and B. S. Varma (Indian Plants reported as Fish-poisons, in Indian Forester, **63**, no. 4, 198 : 1937). T. P. Ghose and S. Krishna (Occurrence of rotenone in *Millettia pachycarpa*, in Current Science, **6**, 57 : 1937) found the roots to contain 4% of total resins and 1.2% of rotenone.

The specimen tested at Rothamsted was received from the Forest Research Institute, Dehra Dun, U.P., India, in 1937 and was probably derived from the same source as that analysed by Ghose and Krishna.

An alcoholic extract was made and diluted with saponin solution, so that each concentration used contained 0.5% saponin and 5% of alcohol, and atomised in the usual way upon the adult apterous females of *Aphis rumicis*. The results were :

Concentration expressed in terms of root.		% paralysed.
1.0	...	100
0.5	...	100
0.25	...	100
0.1	...	55
0.05	...	20
0.025	...	5
Controls—Saponin 0.5%		
Alcohol 5.0%	...	5

The results show this root to have a relatively high toxicity, better than the leaves of *Tephrosia Vogelii* and equal to the root of *T. macropoda* which were tested at the same time. The insecticidal potency of the root of *M. pachycarpa*, however, is not of the same order as that of the rotenone-rich specimens of *D. elliptica*. Unless greatly improved by selection it could not commercially compete with the latter, but where locally available, it should prove of value for purposes of insect control.

### *Ostryoderris gabonica* Dunn.

*Ostryoderris* is a small genus of trees or woody climbers in tropical Africa which is allied to *Derris* and *Lonchocarpus*. Four species occur in West Tropical Africa, *O. gabonica* being one of them. It is a straggling or climbing shrub found in southern Nigeria, the Cameroons and Gabon, and may occur further East. As far as is known the plant does not possess any special economic properties.

*Insecticidal properties.*—Samples of root, stem and leaf of this plant were obtained from the Jardin Botanique d'Eala, Belgian Congo, through the kind assistance of the Director General, Ministry of Colonies, Brussels. The plant is known locally as "Bolemba."

Tested on *Aphis rumicis* the following results were obtained :

Concentrations tested.		% paralysed insects.		
%		Stem.		Root.
5	...	100	...	100
2	...	70	...	90
1	...	0	...	20
Control—Saponin				
Alcohol		3	...	3

The leaf was not insecticidal.

While interesting, these results show that no part of this plant is comparable in insecticidal activity with *D. elliptica*.

### ***Tephrosia macropoda* (E. Mey.) Harv.**

This *Tephrosia* is considerably smaller than *Tephrosia Vogelii* and is straggling in habit, seldom exceeding 7-8 dm. in height. Its distribution is also very much more restricted for it occurs only in the eastern portion of South Africa. It is common in parts of the coastal grassveld of Natal and Zululand.

A variety (var. *angustifolia* E. Mey.) with smaller narrower leaflets, and altogether a smaller plant, has been recorded from Natal and the Eastern Cape Province, but whether its toxic or piscicidal properties differ from those of the ordinary form is not known. Experiments with *T. macropoda* in Natal have shown that it is of fairly rapid growth and responds well to cultivation, producing a larger and less twisted rootstock than in the wild state. The root may be 45 cm. in length and is straight and tapering in well-tilled soil.

In districts where it occurs the plant is well known to the natives as a fish-poison, the root only being used. It is also employed by them in freeing the head of vermin and for medicinal purposes. It is applied externally to sores and in skin complaints, and is also said to be a specific (after roasting) in enteric fever and to be used as an anthelmintic for cattle. In early days the roots were used by settlers as a wash for ridding dogs of fleas.

*Insecticidal properties.*—Tattersfield and Gimingham (The insecticidal properties of *Tephrosia macropoda* Harv. etc., in *Annals Appl. Biol.* **19**, 253 : 1932) have already reported upon the toxicity of samples of *T. macropoda* from Natal to *Aphis rumicis* and to larvae of *Selenia tetralunaria* and *Orgyia antiqua*. Howes (*Tephrosia macropoda* as a possible insecticidal plant, in *Kew Bulletin*, 1937 : 510) has described the results of experiments in Natal designed to obtain information upon the behaviour of the plant when cultivated. A sample of *T. macropoda* roots (cured under cover) was received in

1934 from Dr. A. P. D. McClean of the Natal Herbarium, Department of Agriculture and Forestry, Durban. The ground root was extracted in the cold by soaking with absolute alcohol, and the extract, diluted with 0.5% saponin solution, tested against *A. rumicis*. The results were as follows :

% concentrations tested in terms of root.		% paralysed insects.
0.25	...	96
0.10	...	53
0.05	...	30
Controls	...	20

Two further samples of roots one and two years old respectively, from an experimental plot, were received from Dr. McClean, via Kew, in 1935 and 1936. These were tested as before against *A. rumicis*. The results were :

% concentrations tested in terms of root.		% paralysed insects.	
		1 year old root.	2 year old root.
0.5	...	100	100
0.25	...	96	100
0.20	...	90	—
0.10	...	14	50
0.075	...	—	20
Controls	...	3.8	3

The leaf of the plant one year old showed little or no toxicity when tested at 1.0% concentration in the spray fluid.

*Chemical tests.*—The sample received in 1934 was examined chemically. (Martin, J. T., Occurrence of rotenone in *Tephrosia macropoda* Harv., in *Nature*, 137, 1075: 1936.) The ether extract amounted to 4.2% of the root. Tephrosal was obtained as a pale yellow oil (0.14% of root) of refractive index 1.485 (17°C.). Rotenone, separated from the ether extract as a complex with carbon tetrachloride, was found to be present to the extent of 0.3–0.4% of the root.

From the biological and chemical results, it is unlikely that, unless considerably improved by selection or breeding, *T. macropoda* would be able to compete with derris root in the European or American markets (see also Martin, *loc. cit.*, and Howes, *loc. cit.*).

### ***Tephrosia Vogelii* Hk. f.**

This is one of the best known and most widely cultivated of the several species of *Tephrosia* known to have toxic properties or to be used as fish-poisons. It is a much branched, erect, woody shrub up to 2.5–3 metres in height. It is found both wild and in cultivation and is used by natives as a fish-poison more or less throughout tropical Africa. In forest regions of West Tropical Africa it is commonly cultivated in the fields of the riverine peoples for use in stupefying fish. Both the leaves and the pods may be used.

The plant appears to exist in two forms, the one with white and the other with purplish or violet flowers. Apart from this difference in flower colour the two forms are similar morphologically. Throughout East Africa the white-flowered form predominates but in West Africa the purple-flowered form is the one generally met with.

Apart from its use as a fish-poison this species is reputed to have other uses among the natives. In Uganda the dried, powdered leaves are strewn in huts in order to drive away fleas.

*Insecticidal properties.*—Tattersfield, Gimingham, and Morris (A quantitative examination of the toxicity of *Tephrosia Vogelii* Hk. f., in Ann. Appl. Biol. **12**, 66 : 1925) and Worsley (Insecticidal Properties of some East African Plants, in Ann. Appl. Biol. **21**, 659 : 1934) showed the leaf and seed to be insecticidal. There appeared to be some possibilities of its economic use. The discovery of very potent strains of *Derris* and *Lonchocarpus* species has limited the practical employment of this plant to localities where it is found. Georgi (Note on the ether extract of *Tephrosia Vogelii*, in Malay. Agric. Jour. **25**, 300 : 1937) has pointed out that the amount of the extract is very low compared with that of high-grade *D. elliptica*. The fact that the toxic principles are chiefly concentrated in readily harvested parts of the plant has given an added interest to this plant, and the question has arisen whether varieties exist with an enhanced potency.

Three samples from Uganda were sent by the Imperial Institute to Rothamsted in 1936. One of the samples had purple-coloured flowers. Tested by our usual technique the results given in Table 2 were obtained :

TABLE 2.

Toxicity of the leaf of *Tephrosia Vogelii* to *Aphis rumicis*.

% Concentrations tested in terms of leaf.		% Moribund and Dead Insects.				
		Toro sample Flower colour not given.		Kampala samples.		
				White Flower.		Purple Flower.
1.0	...	100	...	100	...	100
0.5	...	100	...	100	...	100
0.25	...	25	...	25	...	85
0.1	...	5	...	10	...	5
0.05	...	5	...	5	...	5
Controls	...	0	...	0	...	0

The samples are not sufficiently potent to justify any confidence that they would compete successfully with species of *Derris* and *Lonchocarpus* now firmly established as insecticides in the markets of Europe and America. The leaf of the variety possessing purple-coloured flowers appeared somewhat superior to the other two, but this may be due to chance. The selection of much more potent strains than these would be needed to warrant more than a local use.



### **Tephrosia** sp.

A sample of the root of a legume collected in Arnhem Land, North Australia, by Dr. Donald F. Thompson was tested. It is known to the aborigines as "moi-yongo" and reported as a species of *Tephrosia*. Alcoholic extracts showed some toxicity to *Aphis rumicis*. Concentrations in terms of root of 1.0 and 0.1% gave percentage figures of paralysed insects of 90 and 40 respectively. This root might possibly find a local use as an insecticide.

### SUMMARY.

The distribution, native uses, and contact insecticidal properties of a number of fish-poisoning plants are described. None is of the same order of effectiveness as *Derris elliptica*. The most interesting from an insecticidal point of view are a vine from the British Solomon Islands, indistinguishable from *Derris trifoliata*, the leaves of which are toxic, *Dolichos pseudopachyrhizus* from Kenya, *Millettia pachycarpa* from India, *Tephrosia macropoda* from Natal and *T. Vogelii* from Uganda.

## XXIV—CONTRIBUTIONS TO THE FLORA OF SIAM (THAILAND). ADDITAMENTUM LIII.\*

**Gaertnera sralensis** (*Pierre ex Pitard*) Kerr, comb. nov. (Loganiaceae—Gaertnereae). *Psychotria sralensis* Pierre ex Pitard in Fl. Gén. Ind.-Chin. 3, 344 (1924).

Krat, Kao Kuap, 700–900 m., evergreen forest, Kerr 17764, 17798, Put 2939.

The transference of this species to the genus *Gaertnera* is made on account of its inferior calyx.

**Gaertnera taiensis** Kerr (Loganiaceae—Gaertnereae); species *G. ramosae* Ridl. affinis, inflorescentia glabra, floribus minoribus praecipue differt.

*Frutex* vel *arbuscula* usque 5 m. altus, stipulis exceptis omnino glaber, ramulis siccitate nigro-purpureis laevibus teretibus vel subquadrangularibus, ad petioli insertionem callo U-formi notatis. *Folia* oblongo-elliptica vel oblongo-oblancoolata, basi cuneata, apice acute acuminata, 11.5–17.5 cm. longa, 3.2–4.8 cm. lata, chartacea, costa supra prominula subtus prominente, nervis lateralibus 6–8 paribus subtus prominentibus leviter arcuatis marginem versus evanescentibus, nervis transversis subconspicuis; petiolus 1.5–1.9 cm. longus, supra subplanus; stipulae usque ad medium vel ultra connatae, usque 1.5 cm. longae, parte libera apice bifida, pilis brevibus appressis sparse obsitae, deciduae sed parte basali saepe annulatim persistente. *Inflorescentia* terminalis, glabra, paniculato-cymosa, 2.5–4 cm. longa, pedunculo ramulisque valde complanatis; bractae cito deciduae; pedicelli circiter 1–2 mm. longi. *Calyx*

\* Continued from K.B. 1939, 465.

5-dentatus, 0.5 mm. altus, extra glaber, intus basin versus cingulo setarum brevium praeditus. *Corolla* alba; tubus 5 mm. longus, superne sensim ampliatus, extra glaber, intus fauce longe villosus; lobi 3 mm. longi, anguste triangulares, apice inflexi. *Stamina* in fauce inserta, glabra, filamentis circiter 1.75 mm. longis, antheris 2 mm. longis. *Ovarium* glabrum; stylus 6.5 mm. longus, ramis stigmaticis 1.75 mm. longis. *Fructus* didymus vel globosus, circiter 5 mm. diametro.

Trang, Kao Soi Dao, circiter 300 m., in evergreen forest, *Kerr* 19137.

**Canscora hexagona** *Kerr* (Gentianaceae-Chironieae); species *C. pentantherae* C. B. Clarke affinis, calycis tubo valde 6-angulato facile distinguenda.

*Herba* annua, erecta, plus minusve dichotome ramosus, 7–45 cm. alta, omnino glabra; caulis anguste 4-alatus. *Folia* inferiora petiolata, ovato-lanceolata vel ovata, basi late cuneata vel rotundata, apice obtusa, membranacea, usque 7 cm. longa, 4–8 cm. lata, trinervia vel triplinervia; petiolus 3–5 mm. longus, supra concavus; folia superiora sessilia, superne sensim decrescentia, omnia distincta. *Inflorescentia* cymosa, multiflora; bracteae anguste ovatae vel lineares, 1–1.5 mm. longae; pedicelli graciles, 2–10 mm. longi. *Calyx* urceolatus, 6-dentatus, scariosus, manifeste reticulato-nervosus; tubus valde 6-angulatus, 5 mm. longus; dentes acuti, mucronati, 1–5 mm. longi. *Corolla* alba, 6-lobata; tubus subcylindricus, superne leviter sensimque ampliatus, 5 mm. longus; lobi aequales, obovati, rotundati, 2 mm. longi, 1–2 mm. lati. *Stamina* 6, aequalia, medio tubi affixa, filamenta 4–8 mm. longa; antherae 1–8 mm. longae, exsertae. *Ovarium* ovoideum, 3 mm. longum; stylus 4–5 mm. longus; stigma bilobatum, lobis subrotundis. *Capsula* circiter 4 mm. longa, siccitate rugosa, bivalvis, secundum suturas dehiscens; semina ovoidea, minute rugulosa, 0.3 mm. longa.

Korat, Chan Tuk, circiter 300 m., edge of savannah, *Kerr* 8059.

**Gentiana (§ Chondrophylla) arenicola** *Kerr* (Gentianaceae-Swertiaeae); species *G. capitatae* Buch.-Ham. affinis, calyce corollae aequilongo, calycis lobis obtusis differt.

*Herba* annua, erecta, glabra, simplex vel corymboso-ramosa, 7–11 cm. alta, caule siccitate longitudinaliter striatula et minute purpureo-punctato, internodiis usque 2 cm. longis. *Folia* intervallis aequalibus secundum caulem ordinata, sessilia vel brevissime petiolata, oblongo-obovata, basin versus sensim attenuata, apice obtusa, margine minutissime parceque ciliata, haud hyalina, 1.8–2.2 cm. longa, 0.7–1.0 cm. lata. *Inflorescentia* terminalis, subcapitata, 4–20-flora, foliis superioribus cum bracteis pseudo-involucrum efformantibus; bracteae spathulatae, apice rotundatae mucronataeque, scariosae nisi apicem versus viridulae, 3-nerviae, usque 1.6 cm. longae, 0.5 cm. latae. *Calyx* corollae  $\pm$  aequilongus; tubus 5–8 mm. longus, scariosus; lobi oblongi vel oblongo-spathulati

apice rotundati apiculatique, 5.5–7 mm. longi, 2–3 mm. lati, 1-nervii, scariosi nisi apicem versus viriduli. *Corolla* infundibuliformis, circiter 14 mm. longa; tubus circiter 11.5 mm. longus; lobi triangulares, circiter 2.5 mm. longi; plicae triangulares, obtusae, lobis duplo breviores. *Stamina* aequalia, 3 mm. supra basin corollae tubi affixa; filamenta circiter 5 mm. longa, basin versus sensim dilatata; antherae 2 mm. longae. *Capsula* matura e corolla vix exserta, obovoidea, 15 mm. longa, stipite 5 mm. longo incluso, apice alata, alis dentatis; semina ellipsoidea, utrinque apiculata, fusca, longitudinaliter leviter rugosa, circiter 1.2 mm. longa.

Sakon, Wanawn, circiter 200 m., open grassy deciduous forest, *Kerr* 8493.

The specific name refers to the sandy soil of the forests of Eastern Thailand where this plant grows, evidence of which is manifest on the roots of the dried material.

***Gentiana Lakshnakarae* Kerr** (Gentianaceae–Swertieae); species *G. Hesselianae* Hoss. affinis, habitu nano, foliis pro rata angustioribus valde diversa.

*Herba* annua, 3–5 cm. alta; caulis brevis, 1–2 cm. altus, simplex vel pauciramosus. *Folia* rosularia, sessilia vel subsessilia, plana, anguste elliptica vel lanceolata, basin et apicem versus sensim attenuata, apice mucronata, margine haud vel vix hyalina leviter asperula, nervis obscuris, usque 5 cm. longa, 1.6 cm. lata. *Flores* sessiles, caerulei, 2–8 in apicibus caulis et ramulorum dispositi. *Calycis* tubus membranaceus, 5–6.5 mm. longus; lobi ovati, longe aristati, basin versus membranaceus, 4.5–5.5 mm. longi, basi 1.5 mm. lati, margine minute parceque asperuli. *Corollae* tubus circiter 13 mm. longus; lobi ovati, mucronati, circiter 3 mm. longi; plicae lobis duplo breviores, triangulares, apice minute apiculatae. *Stamina* aequilonga, 4.5 mm. supra basin tubi inserta; filamenta circiter 4.3 mm. longa, basin versus leviter dilatata; antherae circiter 2.5 mm. longae. *Capsula* obovata, dimidio superiore satis alte alata, stylo perbrevis, stigmatibus recurvatis 3–4 mm. longis, stipite excluso circiter 5 mm. longa, primo breviter stipitata, denique stipite 9 mm. longo suffulta. *Semina* fusca, ellipsoidea, utrinque apiculata, minute striatula, circiter 0.75 mm. longa.

Loi, Kao Krading, circiter 1200 m., open pine forest, *Lakshmakara* 1392, *Kerr* 8697A (*type*).

***Gentiana (§ Chondrophylla) timida* Kerr** (Gentianaceae–Swertieae); species *G. capitatae* var. *Andersonii* C. B. Clarke et *G. cephalodi* Edgew. affinis, ab ambabus tota planta multo minore, calycis lobis pro rata brevioribus distinguenda.

*Herba* annua, erecta, simplex, circiter 2.8–6.5 cm. alta; caulis gracilis, teres vel subquadratus, minute papillosus, apicem versus scabridulus. *Folia* basalia 0; caulina 4–6, caulis apicem versus aggregata, sessilia, late elliptica vel oblanceolata, apice subacuta,

minute mucronata, margine anguste hyalina et minute ciliata, 6×3·4–11×6 mm. magna, glabra, trinervia. *Flores* 3–6 in apice caulis aggregati, sessiles vel brevissime pedicellati, 9–12 mm. longi, caerulei. *Calyx* tubus c. 2 mm. longus; lobi erecti, longe aristati, 3 mm. longi, margine hyalini. *Corollae* tubus 6·5–8·5 mm. longus; lobi ovati, apiculati, circiter 1·5 mm. longi; plicae leviter bifidae, lobis duplo breviores. *Stamina* aequalia vel subaequalia; filamenta circiter 3 mm. longa; antherae 1 mm. longae. *Capsula* matura e corolla leviter exserta, obovata, dimidio superiore anguste alata, longe stipitata, stipite 7–9·5 mm. longo; semina ellipsoidea, leviter rugulosa, fusca, circiter 1 mm. longa.

Doi Sutep, 1500 m., among grass in open forest, *Kerr* 1579B.

The specific name of this small plant refers to its habit. It is usually more or less hidden by the grass among which it grows, and seldom expands its flowers.

**Swertia (§ Ophelia) callicola** *Kerr* (Gentianaceae–Swertieae); species *S. bellae* Hemsl. affinis, floribus minoribus saepius 5-meris, corollae glandulis angustioribus longius fimbriatis distinguenda.

*Herba* annua, erecta, glabra, leviter ramosa, 8–20 cm. alta; caulis leviter quadrilateralus. *Folia* sessilia vel brevissime petiolata, lanceolata vel elliptica, apice apiculata, usque 2·5 cm. longa, 0·8 cm. lata. *Flores* saepius 5-meri, rarius 4-meri, longe pedicellati, pedicellis vulgo plus minusve curvatis 1·5–3·5 cm. longis. *Calyx* usque ad basin 5-fidus; lobi sub anthesi elliptici, apice acute apiculati, circiter 5 mm. longi, 1·5 mm. lati, cito accrescentes, demum late lanceolati, usque 13 mm. longi, 5·5 mm. lati. *Corolla* alba, purpureo-nervosa, accrescens; tubus sub anthesi 1 mm. longus; lobi subrhombiformes, 9 mm. longi, 3 mm. lati, apice acute apiculati, basi intus glandulis oblongis binis squamulis apice longe fimbriatis obtectis praediti. *Stamina* distincta, in corollae tubo inserta; filamenta circiter 4 mm. longa, basi vix dilatata; antherae circiter 1 mm. longae. *Ovarium* circiter 7 mm. altum; stigma sessile, bilobum. *Semina* ovoidea, minute foveolata, circiter 0·5–0·7 mm. diametro.

Doi Chiangdao, 2000–2100 m., on rocks (limestone), *Kerr* 6543.

**Swertia (§ Ophelia) pinetorum** *Kerr* (Gentianaceae–Swertieae); *S. striatae* Coll. et Hemsl. affinis, foliis minoribus, corollae lobis obovatis distinguitur.

*Herba* annua, erecta, glabra, 10–25 cm. alta, plus minusve ramosa; caulis quadrangularis, foliosus; rami ascendentes. *Folia* sessilia, lanceolata vel elliptica, 3-nervia, caulis parte inferiore circiter 1·5–2 cm. longa, 0·7–0·9 mm. lata, sursum decrescentia. *Flores* 5-meri, rarius 4-meri; pedicelli 1–2·5 cm. longi. *Calyx* usque ad basin 5-fidus; lobi lanceolati, acuti, 3-nervi, circiter 5 mm. longi, basi 1·5 mm. lati. *Corolla* alba, violaceo-striata (ex *Garrett*), circiter 1·8 cm. diametro; lobi obovati, apiculati, circiter 9·5 mm. longi, 5·5 mm. lati, basi glandulis binis oblongis ore fimbriatis praediti;

tubus circiter 1.5 mm. longus. *Stamina* distincta; filamenta circiter 4.3 mm. longa; antherae 2 mm. longae. *Ovarium* 6 mm. altum; stigma sessile, bilobum. *Semina* plus minusve rotunda, leviter complanata, minute foveolata, 0.5 mm. diametro.

Chawm Tawng, Doi Dawk, circiter 1780 m., open grassy land under pine, *Garrett* 619.

***Nymphoides siamensis*** (*Ostenf.*) *Kerr* (Gentianaceae—Menyantheae), comb. nov., descr. emend. et ampl.—*Limnanthemum indicum* var. *siamense* *Ostenf.* in *Bot. Tidsskr.* 24, 263 (1902).

*Herba* glabra. *Folia* natantia, ambitu late ovata, basi alte cordata; petiolus 1–4 cm. longus. *Inflorescentia* 2–20-flora. *Florès* albi, 5-meri. *Calyx* alte 5-fidus; lobi oblongo-lanceolati, acuti, 3-nervi, 6 mm. longi, 1.7 mm. lati. *Corollae* tubus calyce brevior. *Stamina* medio tubo inserta; antherae circiter 1.5 mm. longae. *Nectaria* 5, parva, lobata, ad ovarii basin affixa. *Ovarium* ovoideum, circiter 2.5 mm. altum; stylus circiter 4.5 mm. longus; lobi stigmatici 2–3, ovati, circiter 1.5 mm. longi. *Capsula* calycem vix excedens, circiter 4–6-sperma; semina lenticularia, leviter muricata, circiter 1.2 mm. diametro.

Krat, Kao Saming, under 20 m. alt., in shallow pond, *Kerr* 9432; Satul, Tola, circiter 50 m., in muddy pond, *Kerr* 13865.

The above amplified description is chiefly taken from *Kerr* 9432, which comes from a locality near that of Schmidt's collection, on which *Ostenfeld* based his var. *siamense*. The description of the fruit and seed is from *Kerr* 13865. *Ostenfeld* recognised that his variety differed considerably from *N. indica*, but, his material being poor, refrained from giving it specific rank. The further material now available amply warrants its recognition as a species quite distinct from *N. indica*. Probably in this, as in some other species of *Nymphoides*, the flowers are dimorphic, in which case the above description applies to the long-styled form.

***Cordia Mhaya*** *Kerr* (Boraginaceae—Cordiaceae); species *C. obliquae* Willd. affinis, foliis acuminatis supra minute albo-punctatis distinguatur.

*Arbor*, ramulis teretibus cortice pallide cinereo lenticellis parvis ovalibus pallidis consperso obtectis, innovationibus brunneo-tomentosis cito glabrescentibus. *Folia* coriacea, supra minute albo-punctata, glabra nisi subtus secundum costam et nervos laterales pilis paucis brevibus conspersa, ovata vel late elliptica, basi rotundata vel subcordata, rarius late cuneata, apice abrupte acuminata, margine integra vel repando-crenata, penninervia, costa cum nervis lateralibus subtus prominente supra leviter convexa, nervis lateralibus 5–8 paribus patentibus fere rectis prope marginem anastomosantibus, nervis transversis et rete venularum supra modice subtus valde prominulis, usque 16 cm. longa, 10.5 cm. lata; petiolus 4–5.5 cm. longus, glaber, supra alte concavus. *Inflorescentia* lateralis, cymosa, usque 15 cm. longa. *Calyx* circiter 6 mm. longus,

inaequaliter 2-3-lobatus, extra glaber, intus dense villosus. *Corollae* tubus circiter 4 mm. longus ; lobi 5, reflexi, oblongi, obtusi, circiter 6 mm. longi. *Stamina* 5, corollae fauci inserta ; filamenta basin versus sat dense pilosa. Cetera ignota.

BURMA : Pegu, Kurz (401) 2345 (type). THAILAND : Kanburi, Wangka, c. 200 m., lofty tree in bamboo forest, *Kerr* 10300.

Kurz, *For. Fl. Burma*, 2, 208, in a note after *C. Myxa*, states : " There is another species of *Cordia* (apparently) of which only the leaves are known. These leaves are largely employed by the Burmese for cigar-envelopes. It is called 'mhaya,' and is said to grow abundantly in the Pegu Yomah." In Kew Herbarium there is a sheet of *Cordia* with a Kurz label, on which appears the number (401) 2345, the name *Cordia Myxa* L. and the locality Pegu. The first number has been crossed through and the second added. It is necessary to note this, as there is another sheet, of probably a different species, with the number (395) 2345. To the first sheet Brandis has attached the following observation : " This I identify with the species mentioned by Kurz on p. 208, F.Fl.II, as Mhaya, largely employed as covering leaves for the large Burman cheroots. From *C. Myxa* it differs by longer petioles, adult leaves minutely hairy beneath, rough above with minute cystolith cells. June 1903. D.B." In his *Indian Trees*, 479 (1906), Brandis further refers to this species, giving a short description of the leaves and adding that it is a small tree, but refrains from giving it a name. Kurz says nothing about the size of the tree. Kurz's specimen consists of a branch with several leaves. Some loose male flowers are in a capsule attached to the sheet. The Thai collection agrees very closely with Kurz's, as far as the material goes. It carries inflorescences just coming into flower ; but here again all the flowers are male. They agree well with the loose flowers in the capsule of the Kurz sheet. The above description has been drawn up chiefly from the Kurz sheet, that of the inflorescence being taken from the Thai material.

***Tournefortia intonsa* Kerr** (Boraginaceae—Heliotropieae) ; species affinis *T. Roxburghii* C. B. Clarke et *T. Wightii* C. B. Clarke, ab ambabus foliis majoribus basi cuneatis, nervis lateralibus patentioribus distinguitur ; necnon a *T. ovata* Wall. foliis densius tomentosis, floribus confertioribus recedit.—*T. ovata* Craib in *Kew Bull.* 1911, 422, non Wall.

*Frutex* scandens, ramulis striatis fulvo-tomentosis. *Folia* oblongo-elliptica vel oblongo-lanceolata, basi anguste cuneata, apice sensim attenuata, acuta, margine integra, chartacea, supra pilis brevibus adpressis parce hirsuta, subtus sat dense tomentosa, usque 18 cm. longa, 6 cm. lata, supra costa cum nervis lateralibus leviter impressa, subtus prominula, nervis transversis supra obscuris subtus subconspicuis, nervis lateralibus 8-10 paribus angulo 45° e costa arcuato-ascendentibus ; petiolus 0.7-1.2 cm. longus, dense tomentosus. *Inflorescentia* terminalis, vel ramulos breves laterales terminans, fulvo-tomentosa ; pedunculus 4-9 cm.

longus; rami saepius iterum ramosi; spicae dense multiflorae, 12-25 mm. longae. *Flores* pallide virides, sessiles. *Calyx* 5-fidus; lobi anguste triangulares, acuti, extra intusque dense tomentosi, circiter 1.5 mm. longi. *Corollae* tubus circiter 10 mm. longus, inferne leviter ampliatus, extra tomentosus, intus glaber; lobi 5, rotundati, circiter 1.5 mm. longi. *Stamina* circiter 3 mm. supra basin tubi inserta; antherae lineares, minute apiculatae, circiter 2 mm. longae; filamenta circiter 0.5 mm. longa. *Ovarium* circiter 1.5 mm. altum; stigma sessile, bilobum.

Doi Sutep, c. 900 m., evergreen forest, *Kerr* 2285 (type); Ban Me Ta (between Lampang and Pre), near stream, *Kerr* 997.

## XXV—CONTRIBUTIONS TO THE FLORA OF BURMA: XVII.\*

The regions in brackets after the specific epithet are those from which the species has been reported previously.

***Polygala trichophylla*** *Chodat* [Polygalaceae] (E. Himalayas in India).

Nam Hat Valley, 27°35'N., 97°55'E., 1850 m., fls. Sept., *F. Kingdon Ward* 7381: "Liana in upper forest of Oak, Rhododendron, etc. Calyx and reflexed standard purple, keel and wings bright yellow." Moulmein, *Lobb*, without information. Thaton District: Dawna Range, west side, frt. Feb., *J. H. Lace* 6336.

***Anisadenia saxatilis*** *Griff.* [Linaceae] (Nepal to Assam).

Nam Tamai Valley, 27°45'N., 97°55'E., 1550-1850 m., fls. Aug., *Ward* 7318: "Epiphyte in the forest. Fls. white." N. E. Upper Burma, 3000 m., fls. Sept., *G. Forrest* 24918.

***Fagaria oxyphylla*** (*Edgew.*) *Engl.* [Rutaceae] (Himalayas from Garhwal to Khasia, W. China).

Seinghku Wang, 2000 m., fls. May, *Ward* 6745: "Scrambling up many feet through thickets. Fls. dull-purple with conspicuous bright-yellow anthers; seeds black, polished, like small shot. Whole plant strongly aromatic."

***Apios carnosa*** (*Wall.*) *Benth. ex Baker* [Papilionaceae] (Nepal to Khasia).

Zayul Valley, Kahao, 2150 m., fls. July, *Ward* 7167: "Twinner in thickets in Pine Forest. Fls. red." Ruby Mines District: Kabaing to Kathpyin, 900-1200 m., fls. Oct., *Lace* 5992.

***Desmodium podocarpum*** *DC.* [Papilionaceae] (Simla to Khasia, China, Japan).

Zayul valley, Kahao, 1550 m., fls. July, *Ward* 7157: "In woods. Tall, slender shrub with drooping branches. Fls. pale-pinkish-purple."

\* Continued from K.B. 1939, 337.

**Millettia Dielsiana** Harms [Papilionaceae] (W. China).

Zayul valley, Kahao, 1500 m., fls. July, *Ward* 7153: "Large twiner, spreading over rocks and shrubs in rocky ravines on pine-clad slopes; fls. a sort of raw-meat purple or crimson."

**Rhynchosia himalensis** Benth. ex Baker [Papilionaceae] (India, Himalayas).

Zayul Valley, Kahao, 1500 m., fls. July, *Ward* 7156: "Twinner in open pastures and rocky places forming low massive growths; fls. yellow, standard heavily veined with purple."

**Fragaria nubicola** Lindl. [Rosaceae] (Himalayas as far East as Sikkim).

Seinghku Wang, 28°8'N., 97°24'E., 3400 m., fls. June, *Ward* 6919: "In open pastures and on boulders. Fls. white."

**Maddenia hypoxantha** Koehne [Rosaceae] (W. China).

Seinghku Wang, 3100 m., fls. early June, *Ward* 6811: "Small shrub in thickets or in the open on steep faces. Fls. white, very fragrant."

**Neillia thyrsiflora** Don [Rosaceae] (Central and Eastern Indian Himalayas, China, Java).

Seinghku Valley, 1200–1500 m., fls. Aug., *Ward* 7278: "Lax shrub 6–10 ft. high, sending up many branches which droop over. In thickets and open places at edges of the forest. Fls. white."

**Potentilla peduncularis** Don [Rosaceae] (Himalayas as far East as Sikkim).

Seinghku Valley, 28°10'N., 97°20'E., 3400 m., fls. Oct., *Ward* 7595: "Scattered on sunny turf or grit slopes. Fls. golden-yellow."

**Prunus rufa** Wall. [Rosaceae] (Nepal to Bhutan).

Seinghku Wang, 28°8'N., 97°24'E., 3400 m., fls. June, *Ward* 6949. "Small, spreading shrub, branches expanding horizontally. In thickets amongst boulders in the valley. Fls. pale-pink, hanging from the flattened branches." 2750–3100 m., fls. early June, *Ward* 6983: "6–10 m. high. In thickets and on meadow-clad slopes. Fls. white."

**Rosa sericea** Lindl. [Rosaceae] (Kumaon to Bhutan, W. China).

Seinghku Wang, 28°8'N., 97°24'E., 3400–3700 m., fls. July, *Ward* 7035: "Dwarf shrub, more or less prostrate, branches ascending, compact. On sloping granite rocks in thickets of dwarf Rhododendron. Fls. pale-sulphur, anthers cream, stigmas golden."

**Rubus eustephanos** Focke [Rosaceae] (W. China).

Nam Tamai, 1200–1500 m., fls. and young frt. early May, *Ward* 6690: "In thickets of secondary, mostly scrub jungle on old cultivated slopes. Small, spreading, scrambling bush. Stems red; fls. pure-white, slightly fragrant."



**Rubus Hookeri** Focke [Rosaceae] (Sikkim).

Seinghku Wang, 2300 m., fls. end May, *Ward* 6778: "On steep, stony slopes on the edge of the 'dry' forests (i.e., facing the sun) or in thickets in open shaded situations. Undershrub, more or less prostrate and ascending. Fls. large, nodding, cream."

**Sorbus Rehderiana** Koehne [Pomaceae] (W. China).

Seinghku Wang, 28°8'N., 97°24'E., 3700–4000 m., fls. July, *Ward* 7095: "Shrub 2.5–3.5 m. high, growing among Rhododendrons on the more sheltered slopes. Leaves polished. Fls. white unpleasantly scented."

**Sorbus ursina** Wenz. [Pomaceae] (Kumaon to Sikkim).

Seinghku Wang, 3100 m., fls. early May, *Ward* 8658: "Small tree in tanglewood and open thickets. Fls. dull-red."

**Leptodermis Wardii** C. E. C. Fischer et K. N. Kaul, sp. nov. [Rubiaceae]; *L. Potanini* Batal. similis, sed foliis adultis rigidis glabris (nervis supra hispidis exceptis) reticulationibus obscuris, stipulis rigidis longitudine sua latioribus a petiolis liberis, corollis extra glabris, antherarum filamentis longioribus.

A bushy undershrub about 33 cm. high; stems up to 4 mm. diam., greyish and glabrous below, with 2 lines of hispid pubescence and often reddish above; lower internodes up to 5 cm. long, upper much shorter. *Leaves* rigid, elliptic to broadly ovate, acute at both ends, 1.2–4.1 cm. long, 0.6–2.4 cm. wide, dark-brown (when dry) above, pale below, glabrous except the hispid midrib and the 3–4 pairs of primary nerves above, more pronounced when young, reticulations obscure, margins ciliate; petioles 1–5 mm. long, hispidulous above; stipules rigid, free from the petioles. *Inflorescence* terminal on the branchlets and axillary in the upper leaves; flowers solitary or a few fascicled; pedicels 0–2 mm. long; bracts united in a short sheath round the pedicels, the free ends broadly ovate or broader than long, acute, with a sharp tooth on either side a little below the ciliate apex, keeled, 2 mm. long; bracteoles 2 at the base of the ovary, resembling the bracts but much smaller. *Calyx-tube* and ovary obconic, 2.5–3 mm. long, glabrous, blackish when dry; tube above the ovary very short; lobes 5 (rarely 6), triangular-lanceolate, acute, 1 mm. long. *Corolla-tube* narrowly funnel-shaped, straight or slightly curved, 7.5–8.5 mm. long, glabrous without, crisped-hairy above the middle within; lobes 5, induplicate-valvate, shortly decurrent on the tube, lanceolate to ovate, acute, 2.5 mm. long, minutely puberulous at the tip without, beset with thickish white hairs within. *Stamens* 5, inserted above the middle of the corolla-tube; filaments slender, 1.6 mm. long, glabrous; anthers linear, 2.6–2.9 mm. long, dorsifixed, half exserted. *Ovary* 4–5-celled, crown flat; style slender, 4–4.5 mm. long, glabrous, stigmas 3–5, filiform, papillose, about reaching the base of the filaments. *Fruit* not seen.

Seinghku Valley, 28°5'N., 97°30'E., 2770 m., fls. Oct., *Ward* 7610: "Forming compact clumps on limestone cliffs facing south on the open ridge. Fls. cream, slightly fragrant."

**Codonopsis Benthami** *Hook. f.* [Campanulaceae] (Sikkim).

Di Chu Valley, 3400 m., fls. end July, *Ward* 7193: "Erect or weakly twining, 1 m. or more long. Often in clumps in meadows. Fls. bright-yellow, base finely purple-speckled, ovary and style purple-black; fragrant." Seinghku Valley, 28°10'N., 97°20'E., 4000 m., fls. and frt. early Oct., *Ward* 7531: "On steep grass slopes, semi-erect or ascending or lying along the slopes in clumps or singly; abundant. Fls. pale greenish-yellow, purple-speckled at the base within."

**Lonicera chlamydata** *W. W. Sm.* [Caprifoliaceae] (Yunnan).

Seinghku Wang, 28°8'N., 97°24'E., 3400 m., fls. June, *Ward* 6906: "Spreading, 1 m. or less high, sometimes forming a thick bush. On or amongst boulders on steep slopes. In thickets of shrubs or solitary. Fls. rather dull-yellow; berries translucent blood-red."

**Lonicera hispida** *Pall. ex Roem. et Schult.* [Caprifoliaceae] (Central Asia, Kashmir to Sikkim, China).

Seinghku Wang, 28°8'N., 97°24'E., 3400-3700 m., fls. June, *Ward* 6946: "1 m. or less high, branches outspread. In thickets on boulder slopes beneath *Abies* forest on the sheltered slope of the valley. Fls. yellow; berries glaucous blue." The specimens are not typical of the species.

**Lonicera Myrtillus** *Hook. f. et T.* [Caprifoliaceae] (Kashmir to Sikkim).

Seinghku Wang, 28°8'N., 97°24'E., 3400 m., fls. June, *Ward* 6973: "Almost prostrate, spreading shrub growing over boulders in the open valley. Fls. purple-rose."

**Lonicera trichosantha** *Bur. et Franch.* [Caprifoliaceae] (W. China).

Di Chu Valley, 3100-3400 m., fls. July, *Ward* 7127: "Large, spreading bush. Fls. cream when first open, changing to a deeper yellow with age; berries bright translucent orange."

**Hoya erythrostemma** *Kerr* [Asclepiadaceae] (Siam).

S. Tenasserim, Thebyu Chaung, 65 m., fls. Feb., *C. E. Parkinson* 1680: "Climber. Juice milky; fls. white to mauve."

**Centranthera grandiflora** *Benth.* [Scrophulariaceae] (Sikkim, Assam).

Zayul Valley, Kahao, 1850 m., fls. July, *Ward* 7165: "Only seen on the upper pine- and bracken-clad terraces; fairly abundant. Roots orange; fls. bright-yellow."

**Pedicularis diffusa** *Prain* [Scrophulariaceae] (Sikkim).

Seinghku Wang, 28°8'N., 97°24'E., 3400 m., fls. early July, *Ward* 7028: "In pastures by streams. Fls. pinkish-purple."

**Pedicularis Elwesii** Hook. f. [Scrophulariaceae] (Sikkim, Yunnan).

Seinghku Wang, 28°8'N., 97°24'E., 3400 m., fls. early July, Ward 7027: "In open pastures on mossy boulders, etc. Fls. rich purple."

**Pedicularis nana** C. E. C. Fischer, sp. nov. [Scrophulariaceae]; a *P. collata* Prain caule verticillo foliorum 4-5 supra bina basalia instructo, foliis pedicellis floribusque brevioribus, corolla intus glabra, labii marginibus denticulatis, galea margine integra differt.

A diminutive, caespitose herb; roots fibrous; stems slender, 1-3 cm. long, glabrous below, more or less pubescent upwards. Leaves few, a basal opposite pair a little above the base and a whorl of 4-5 higher up, usually above the middle; blade subcircular, oblong or linear-oblong in outline, 4-6 mm. long, 2-4 mm. wide, pinnatifid into 3-4 pairs of rotund to ovate thick segments with lobulate margins; petioles slender, 6-12 mm. long. Racemes terminal, subcapitate, few-flowered; bracts like the leaves but shorter and with wider, 1-costate petioles; pedicels 2-3 mm. long. Calyx tubular-campanulate, slightly oblique at the base, sparingly villous without; tube entire, thinly membranous, 4-5 mm. long, with 10 dark veins; lobes 5, subequal, oblong, obtuse, 1-5 mm. long, somewhat thickened and dark at the apex. Corolla crimson; tube cylindric, slightly widened at the mouth, 1-1 cm. long, 15-veined below; lip reniform in outline, 5-5 mm. long, 8-5 mm. wide, 3-lobed, apical margins denticulate, midlobe rounded, 2-4 mm. long, lateral rotund-oblong, 3-7 mm. long; galea erect, 4-5 mm. long. Stamens inserted near the base of the corolla; filaments narrowly strap-shaped, 1-costate, glabrous, one pair slightly longer than the other; anthers broadly ovate, 1-5 mm. long, base of cells acute. Ovary sessile, ellipsoid, 1-5 mm. long; style filiform, stigma globose, hardly exserted. Capsules (of previous year and devoid of seed) oblong-lanceolate, acuminate, 6-5 mm. long.

Seinghku Wang, 28°8'N., 97°24'E., fls. July, Ward 7093A: "On grassy ledges of limestone cliffs, embedded with other species of *Pedicularis* and mosses in mats of dwarf *Salix*."

**Pedicularis Pantlingii** Prain [Scrophulariaceae] (Nepal, Sikkim).

Seinghku Wang, 28°8'N., 97°24'E., 2150 m., fls. and young frt. end May, Ward 6772: "In alder copse. Fls. pinkish-purple with darker veins." 2900 m., fls. early June, Ward 6895: "On meadow slopes in the open." 3400 m., fls. late June, Ward 6999: "On steep earth banks. Fls. pale purplish-pink."

**Pedicularis rotundifolia** C. E. C. Fischer sp. nov. [Scrophulariaceae]; *P. sabaënsis* Bonati affinis, sed foliis bracteisque brevioribus subcircularibus fiabellatis lobatis, calyce brevioris haud translucente, labii marginibus integris differt.

A low herb; rootstock slender, fusiform; stems several, woody, slender, terete, slightly sulcate near the apex, 10-15 cm. long, with

two lines of pubescence below and at the apex, glabrous in the middle, internodes long. *Leaves*: radical not seen; cauline opposite, 2 pairs, circular or slightly broader than long, 4-7 mm. diam., the upper the larger, shallowly 8-10-lobed, lobes oblong or flabellate, bluntly 3-lobiculate and these again often bluntly, rarely acutely, 2-lobed, veins obscure, furfuraceous hairy on both faces; petioles 0 or very short. *Inflorescence* terminal in congested or slightly lax heads; bracts like the leaves; pedicels very short. *Calyx* tubular; tube entire, 4-5 mm. long, villous without; lobes 5, posterior ensiform, acute, 1.5 mm. long, the others rotund, subequal, coarsely crenate, 2 mm. diam., pubescent on both sides. *Corolla* crimson; tube slender, 1.07-1.3 cm. long, sparingly puberulous without; lip broadly ovate, 7.5 mm. long, 6.7 mm. wide, 3-lobed, midlobe oblong, 3.5 mm. long, lateral semicircular, 3-5 mm. diam.; galea glabrous, bent at right angles, slightly swollen at the bend, erect portion 3.5-4.5 mm. long, beak straight or slightly curved, 6.2-7.2 mm. long, apex entire, truncate. *Stamens* inserted above the middle of the corolla-tube; filaments filiform, glabrous; anthers elliptic-oblong, 2 mm. long. *Ovary* sessile, ellipsoid, 2.5 mm. long; style filiform; stigma capitate. *Fruit* not seen.

Seinghku Valley, 3380 m., fls. late July, *Ward* 7216: "In pastures and meadows."

***Briggsia muscicola* (Diels) Craib** [Gesneriaceae] (Yunnan).

Di Chu Valley, 2770 m., fls. July, *Ward* 7135: "On mossy tree-trunks in mixed forest. Fls. egg-yellow finely mottled with red-brown."

***Ficus nemoralis* Wall.** [Moraceae] (Indian Himalayas).

Seinghku Wang, 1540 m., young receptacles May, *Ward* 6723: "Medium-sized, spreading tree, common but confined to the jungle by the river. Usually laden with epiphytes and often hanging over the river. One of the very few species of *Ficus* at this altitude."

***Larix Griffithii* Hook. f. et Thoms.** [Coniferae] (Nepal to Bhutan.)

Di Chu Valley, 3400-3700 m., cones end July, *Ward* 7191: "Tall, graceful tree on the steep granite cliffs and flanks of the valley, with *Abies*; nowhere forming forests by itself. Much more abundant on the North side of the snow range than on the Burma side, where it is rare."

***Iris kumaonensis* Wall.** [Iridaceae] (Kashmir to Kumaon).

Seinghku Wang, 28°8'N., 97°24'E. 3400-3700 m., fls. June, seeds Oct., *Ward* 6917: "In tight dwarf clumps on steep grassy banks amongst *Rhododendron* bushes. Falls rich gleaming purple, standards white with a purple band down the centre, beard yellow; fragrant."

***Allium Wallichii* Kunth** [Liliaceae] (Gilgit to Sikkim).

Seinghku Valley, 28°10'N., 97°20'E., 3400-3700 m., fls. Oct., *Ward* 7554: "In alpine meadow. Fls. purple." 28°8'N., 97°25'E.,

3100-3400 m. fls. late Sept., Ward 7517: "On steep meadow slopes beneath the cliffs, 60-100 cm. high; fls. mauve; whole plant strongly scented."

## XXVI—ADDITIONS TO THE FLORA OF BORNEO AND OTHER MALAY ISLANDS: XVII.\*

TWO NEW BORNEAN RUBIACEAE. C. E. B. BREMEKAMP.

*Lecariocalyx Bremek.*, gen. nov. *Psychotriearum*, inflorescentia terminali una cum endospermo ruminato ad *Grumileam* Gaertn. et ad *Peripelum* Pierre accedens, calyce rotato, fructu accrescente ab iis recedens.

*Rami novelli* et *folia* infra pilis septatis vestita. *Stipulae* in vaginam ampliorem connatae, lobis interpetiolaribus apice in aristas duas exeuntibus. *Inflorescentia* terminalis, sed ope ramuli axillaris mox in positionem lateralem coacta, pedunculata, capitata vel e capitulis pluribus composita; bracteae angustae, ciliatae; bracteolae nullae. *Flores* hermaphroditi, 4- vel 5-meri, forsitan heterostyli. *Ovarium* biloculare; ovula in quoque loculo solitaria, ascendentia. *Calyx* rotatus, lobis ovatis vel ovato-orbicularibus trinerviis magnis. *Corolla* hypocrateriformis, tubo os versus tamen paulum dilatato fauce dense sericeo-villoso, lobis aestivatione valvatis. *Stamina* in corollae fauce inserta, antheris basifixis introrsis. *Discus* semiglobosus, sulcatus. *Stylus* filiformis; stigmata 2, oblonga, brevia. *Fructus* drupaceus, calyce accrescente coronatus, subcostatus, bipyrenus. *Semina* endospermo ruminato praedita, embryone parvo.

Genus adhuc monotypicum terrae Borneënsis partem occidentalem habitans.

*Lecariocalyx borneënsis* Bremek., sp. nov. (unica).

*Habitus* ignotus. *Rami novelli* teretes, 2.5 mm. diametro, dense hirtello-tomentosi. *Folia* petiolo dense hirtello-tomentoso 2-4 mm. longo suffulta; lamina elliptica vel obovata, 5-6.5 cm. longa, 2-2.7 cm. lata, apice longius acuminata, basi acuta et haud raro conduplicata, subcoriacea, siccitate supra saturate et subtus dilute brunnea, supra glaberrima, subtus costa nervisque dense hirtello-tomentosa, inter nervos sparse et fugaciter pilosa et minute albidolepidota, costa subtus crassa valde prominente, nervis utroque latere costae 8-9 supra immersis subtus prominulis, venulis paucis. *Stipulae* in vaginam 4 mm. altam connatae, lobis late triangularibus 5 mm. latis 1 mm. altis, aristis gemellis 1.5 mm. longis, extra sparse hirtellae, basin versus glabrescentes, axilla sericeae. *Inflorescentia* pedunculo dense hirtello-tomentoso 2.7-3.0 cm. longo elata, nunc e capitulo singulo, nunc trichotome ramificata et e capitulis tribus formata, in quo casu ramuli 1 cm. longi foliis lineari-lanceolatis 3 cm. longis suffulti; capitula 1.7-2.0 cm. diametro, basi foliis linearibus

\* Continued from K.B. 1939, 545.

1.3–2.0 cm. longis suffulta; flores dichasialiter dispositi, bracteis linearibus margine graciliter ciliatis extra basin versus hirtello-tomentosis costa hirtellis suffulti. *Flores* alii 4-meri, alii 5-meri. *Ovarium* turbinatum, extra dense et longe sericeum. *Calycis* tubus late infundibuliformis, 1–1.5 mm. altus, 1.4 mm. diametro, intus sericeo-villosus; lobi 4, aequales, vel 5, nunc aequales, nunc inaequales, 4 mm. longi, 3–5 mm. lati, extra sparse hirtelli, margine subpellucide ciliati, intus glabri. *Corollae* tubus 4.5 mm. longus, basi 1.2 mm., fauce 1.6 mm. diametro, extra glaber; lobi oblongi, 2.5 mm. longi, 0.9 mm. lati, apice acuto incurvati, extra apice hirtelli, intus glabri. *Stamina* filamentis glabris 2 mm. longis exserta; antherae oblongae, obtusae, 1 mm. longae. *Discus* glaber. *Stylus* glaber, 4.5 mm. longus; stigmata 0.5 mm. longa, subinclusa. *Drupa* hirtello-tomentosa, calyce ad magnitudinem duplam aucto coronata.

SARAWAK. Sine loc., *Native Collector* (Sarawak Museum) 1362 (typus, Herb. Kew.).

The difference in height between the anthers and the stigmata suggests heterostyly, a condition not uncommon among the *Psychotrieae*.

**Gaertnera schizocalyx** Bremek., sp. nov., a congeneribus omnibus calyce in lobos lineares partito conspicue diversa; inflorescentia hirtella et congesta etiam facile cognoscenda.

*Habitus* ignotus. *Rami novelli* pilis incurvatis dense griseo-villosi, deinde glabrescentes et mox cortice albido vestiti, teretes. *Folia* petiolo supra glabro subtus dense hirsuto 5–6 mm. longo suffulta; lamina oblanceolata vel anguste obovata, 8.5–12.5 cm. longa, 2.5–4 cm. lata, caudato-acuminata, basi acuta, subcoriacea, supra nitidula, siccitate supra saturate subtus dilute brunnea, supra glaberrima et dense nigro-punctata, subtus costa nervisque satis dense et inter nervos sparse hirsuta et albo-punctata, nervis utroque latere costae 5 subtus prominulis sub margine arcuatim collectis, venulis pluribus e costa ortis patentibus. *Stipulae* petiolum margine satis lato cingentes, supra petiolum in vaginam villosam 4 mm. altam connatae et utrinque in aristas duas villosas 2.5 mm. longas exeuntes, intus glabrae, axilla sericeae. *Inflorescentia* breviter pedunculata, subglobosa, 1.5 cm. diametro, dense hirtella; bractee lineares, 4 mm. longae, basi dilatatae et appendicibus utroque latere 3 pectinatae, extra et praesertim margine hirtellae, intus subglabrae; bracteolae anguste lineares, 3 mm. longae, basi interdum subdilatatae, et hinc inde appendicibus brevibus munitae, extra hirtellae. *Flores* sessiles, 5-meri. *Ovarium* semi-inferum, extra sparse et brevius hirtellum, usque ad calycis insertionem, 0.6 mm. altum. *Calyx* extra et praesertim margine hirtellus, intus glaber, tubo 0.7 mm. alto, lobis linearibus subobtusis 2.5 mm. longis 0.7 mm. latis. *Corollae* tubus cylindricus, 3 mm. altus, 0.8 mm. diametro, extra glaber, intus fauce dense albo-barbatus; lobi crassiusculi, extra dense hirtelli, intus glabri, 1.8 mm. longi, 0.5 mm. lati.

*Stamina* in corollae fauce inserta, filamentis glabris applanatis 0.7 mm. longis, antheris basifixis ovoideis obtusis 0.8 mm. longis. *Discus* (dimidium superius ovarii) glaber, 0.5 mm. altus. *Stylus* glaber, stigmatibus filiformibus 0.3 mm. longis comprehensis 4 mm. longus, i.e., sicut stamina breviter exsertus. *Drupa* ignota.

SARAWAK. Sine loc., *Beccari* 1799 (typus, Herb. Kew.).

The half-inferior ovary, but perhaps even more the peculiar way in which the petioles are surrounded by a collar-like excrescence from the stipular sheath, and the black dots on the upper side of the leaves assign to this plant a place in the genus *Gaertnera* Lam. On account of the long calyx lobes it occupies an isolated position, for in the other species the calyx is cupular and subtruncate.

## XXVII—PLANTS NEW TO ASSAM: XII.\*

The regions in round brackets indicate the localities from which the species have been previously recorded.

***Lonicera deleiensis*** C. E. C. Fischer et K. N. Kaul, sp. nov. [Caprifoliaceae]; *L. angustifoliae* Wall. affinis, foliis haud lanceolatis haud acutis subtus vix albis, bracteis ovatis, floribus duplo majoribus distat.

A small *shrub*; branchlets solid, reddish, shining, 2–3 mm. diam., peeling, nodes sometimes considerably swollen; lateral twigs short, subtended by numerous brown, ovate, keeled scales up to 2 mm. long. *Leaves* varied, nearly circular, broadly elliptic, ovate or obovate, apex rounded or slightly narrowed, obtuse, base usually cuneate, sometimes rounded, 1–5 cm. long, 0.7–3 cm. wide, primary nerves 4–9 pairs, with the midrib and fine reticulations slightly impressed above, brown (when dry) and glabrous above, pale below and abundantly dotted with minute grey scales, margins slightly revolute; petioles 2–3 mm. long. *Inflorescence* axillary; peduncles solitary, slender, 2.5–3.5 cm. long; bracts free, ovate, obtuse, 5–5.5 mm. long; bracteoles united into a thin, entire cup 2.5 mm. long. *Ovaries* completely fused into a sessile subglobose element 3.2 mm. long, each 2–3-celled. *Calyx* yellowish; tube very short, with a fold across the outer side; lobes 5, ovate or oblong, obtuse, 7 mm. long. *Corolla* tubular-funnel-shaped, base slightly oblique, 1.1–1.2 cm. long, glabrous without, hairy on the upper  $\frac{2}{3}$  within; lobes 5, nearly circular or broader than long, 5–5.5 mm. diam. glabrous outside, minutely papillose within. *Stamens* 5, inserted a little below the middle of the corolla tube, included; filaments 1.5–2 mm. long, glabrous; anthers linear, 2 mm. long. *Style* subulate, 5 mm. long, glabrous; stigma capitate, 1.5 mm. diam. *Fruit* not seen.

DELEI VALLEY; 28° 20' N., 96° 37' E., 3380–3700 m., fls. June, F. Kingdon Ward 8349: "Scattered in the *Abies-Rhododendron* forest. Fls. opening pink, usually fading white."

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\* Continued from K.B. 1940, 42.

**Lonicera Henryi** Hemsl. [Caprifoliaceae] (N. Burma, W. China).

DELEI VALLEY; 28°20'N, 96°35'E, 2450–2770 m., fls. late July, *Ward* 8498: "Twiner in *Tsuga-Rhododendron* forest. Fls. cream." 2770–3000m., fls. mid-Aug., *Ward* 8558: "Twiner in thickets along the ridge. Fls. opening cream, later turning a darker yellow."

**Lonicera Kingdonii** C. E. C. Fischer et K. N. Kaul, sp. nov. [Caprifoliaceae]; *L. tanguticae* Max. affinis, foliis obovatis acutis glabris, bracteolis praesentibus, corollis basi angustis, stylis inclusis differt.

A small *shrub*; branchlets solid, pale-brown, 2–3 mm. diam, peeling; ultimate twigs bifarious, very slender, 3–12 cm. long, reddish-brown, subtended by several pale-brown, ovate or lanceolate, acute, keeled scales 3–4 mm. long. *Leaves* membranous, elliptic, elliptic-lanceolate or elliptic-oblong, tapering to an acute or subacute apex, base cuneate, 2–5 cm. long, 0.7–1.3 cm. wide, when dry dark-olivaceous above, greyish below, midrib impressed above and slightly raised below, primary nerves 5–9 pairs, ultimate reticulation minute, clearly visible below, very slightly (under the lens) bullate above, margins slightly revolute, at least when dry; petioles 2–4 mm. long, slightly widened at the base and the opposite pairs joined by a shallow ridge. *Inflorescence* axillary; peduncles solitary, filiform, 2.5–4 cm. long, 2-flowered; bracts free, narrowly lanceolate, acute, 8.5 mm. long, 1-costate; bracteoles united into a thin cup 1.6 mm. long. *Ovaries* united in the lower half, ovoid, 2 mm. long, 2-celled, ovule solitary. *Calyx-tube* 0.5 mm. long; lobes 5 subequal, oblong, subacute, 1 mm. long. *Corolla-tube* cylindric, slightly narrowed at the base, 1.1 cm. long, 10 veined, glabrous without, thinly pubescent within; lobes 5, slightly unequal, ovate, broadly oblong or semi-circular, 2.5–3.1 mm. long. *Stamens* 5, included, inserted below the middle of the corolla-tube; filaments filiform, 1.5 mm. long; anthers linear, 2.2 mm. long. *Style* subulate, 2.3 mm. long; stigma capitate, globose or broadly oblong, entire, 1 mm. long. *Fruit* not seen.

DELEI VALLEY; 28°21'N., 96°37'E., in forest at 3080–3390 m., fls. June, *Ward* 8331: "Fls. white, faintly tinged with purple."

**Viburnum cordifolium** Wall. [Caprifoliaceae] (Kumaon to Bhutan).

DELEI VALLEY; 28°21'N., 96°37'E., 3370–3680 m., fls. June, *Ward* 8314: "With birch and scrub *Rhododendron* all along the ridge in *Abies* forest, especially where there is bamboo. A scrub bush with fragrant white flowers, anthers purple." 28°15'N., 96°35'E., 2760–3680 m., fls. and young frt. late Aug., *Ward* 8618: "Small tree very common in *Rhododendron* forest. Berries now red, a few already black." 28°15'N., 96°40'E., 3680 m., ripe frt. early Oct., *Ward* 8687: "Small shrub along open ridges amongst *Rhododendron* and other shrubs. Ripe berries black."



**Androsace Henryi** Oliv. [Primulaceae] (N. Burma, W. China).

DELEI VALLEY; 28°15'N., 96°35'E., 2770-3100 m., frt. Aug., Ward 8565: "On steep shady bank of North-facing gully in *Rhododendron-Tsuga* forest; heavily shaded and more or less hidden amongst undergrowth."

**Buddleja Hookeri** Marq. [Loganiaceae] (Sikkim, N. Burma).

DELEI VALLEY; 28°15'N., 96°35'E., 2770 m., fls. late Aug., Ward 8598: "Small shrub in thickets on the sunny slope. Fls. cream with orange centre; very fragrant."

**Onosma emodi** Wall. [Boraginaceae] (Garhwal to Bhutan, S. Tibet).

DELEI VALLEY; 28°21'N., 96°37'E., 3380 m., fls. June, Ward 8348: "In colonies on ledges of gneiss cliffs in *Abies-Rhododendron* forest facing south. Fls. in drooping heads, opening purple but ultimately more or less blue."

**Trigonotis rotundifolia** (Wall.) Benth. [Boraginaceae] (Punjab to Sikkim).

DELEI VALLEY; Kaso, 28°21'N., 96°37'E., 3650-4000 m., fls. and frt. early July, Ward 8418: "On steep subalpine slopes facing South. Fls. pale sky-blue."

**Chirita stolonifera** C. E. C. Fischer et K. N. Kaul, sp. nov. [Gesneriaceae]; *C. lachenensi* C. B. Clarke peraffinis, caule stolonifero, foliis solitariis cordatis, maturis subtus glabris, pedunculis 1- raro 2-floris, inflorescentia haud glandulosa differt.

A stoloniferous herb; stolons slender, up to 20 cm. long, nearly black, sparsely (densely when young) crisped brown-hairy. *Leaves* solitary, radical, thinly membranous, cordate, obtuse, sinus usually deep, basal lobes rounded, equal or somewhat unequal, 5.3-10.5 cm. long, 4.5-8 cm. wide, primary nerves 6 pairs, silvery-brown felted on both faces at first, when mature dark and sparsely dotted with short hairs above, paler and glabrous or nearly so below, margins distinctly and shallowly crenate-serrate or sometimes more closely and coarsely dentate; petioles 7-20 cm. long, densely brown-villous when young, becoming nearly glabrous with age. *Peduncles* erect, solitary in the axils of the young leaves, usually 1-, rarely 2-flowered, slender, dark, sparsely brown-pilose, 6-8 cm. long; bracts 2, opposite, above the middle of the peduncle but well below the nodding flower, up to 4 mm. long, brown-hairy. *Calyx-segments* 5, nearly free, caducous, narrowly lanceolate, acuminate, subequal, 5-7 mm. long, sparsely brown-pilose. *Corolla* funnel-shaped, mouth oblique, puberulous without; tube 1.7-2 cm. long, glabrous within, with 2 longitudinal folds opposite the stamens; limb 2-lipped, lobes 5, rounded, subequal, 7-10 mm. diam. *Stamens* 2, included, inserted a little below the middle of the tube; filaments ensiform from a moderately broad base, 4-5 mm. long, pubescent upwards; anthers rounded, 2 mm. diam. *Staminodes* 2, linear, short. *Ovary*

sessile, linear, 5-6 mm. long, puberulous ; style as long, puberulous ; stigma funnel-shaped. *Capsule* (immature) linear, straight, 4 cm. long, glabrous.

DELEI VALLEY ; 28°21'N., 96°37'E., 1850-2150 m., fls. July, Ward 8462 : " On rocks and banks in the forest. Fls. more or less hidden beneath the leaves, mouth of corolla pure violet, throat white with yellow streaks."

**Radermachera Borii** C. E. C. Fischer, sp. nov. [Bignoniaceae] ; *R. xylocarpae* (Roxb.) K. Sch. similis, sed foliis caudatis, calycibus majoribus lageniformibus inferne valde 5-sulcatis, corollis anguste infundibularibus, capsulis multo angustioribus spiralibus, seminibus minoribus.

*A tree.* *Leaves* bipinnate, 35 cm. or more long ; petiole sulcate above ; pinnae, 4 pairs and a terminal, up to 17 cm. long, partial petioles terete, up to 3.5 cm. long, the lower the longer ; leaflets 2-3 pairs and a terminal (uppermost 3-foliolate), lanceolate, caudate, base acute, 4.5-8 cm. long, 1.5-3 cm. wide, primary nerves 4-6 pairs, dark-olivaceous (when dry) and minutely puberulous above, especially on the midrib and nerves, paler and dotted with minute discoid scales below ; petiolules terete, 4-15 mm. long, the lowest the longest, glabrous or minutely puberulous. *Cymes* dichotomous apparently few-flowered ; partial rhachises (in fruit) somewhat compressed, pale-brown ; pedicels terete, 4-4.5 cm. long. *Calyx* fleshy, flagon-shaped, 2.7 cm. long, swollen and thickened at the base, 1.2 cm. diam., 5-grooved, tubular portion 7-8 mm. diam., longer than the swollen portion, 5-ribbed, the ribs arising from the apices of the grooves, shortly split anteriorly ; lobes 3, unequal, ovate, obtuse, 4 mm. long. *Corolla* cylindric-funnel-shaped ; tube 4 cm. long, 4 mm. diam. at base, 8.9 mm. diam. at the mouth and there slightly laterally compressed ; lobes 5, rather fleshy, rotund-oblato, much plicately imbricate in bud, margins crisped, 1.5 cm. long, 2 cm. wide. *Stamens* 4 perfect, inserted about  $\frac{1}{3}$  up the corolla tube ; filaments subulate, 2.8 cm. long ; anthers of 2 divaricate, linear cells 4 mm. long, connective apiculate, 1.3 mm. long ; staminode 0 or 1 slender, less than half as long as the filaments. *Disk* annular, 1 mm. long. *Ovary* linear, 6.3 mm. long, covered with minute discoid scales ; ovules in 8-10 rows ; style slender, overtopping the anthers ; stigmas 2, oblate, flat, 3 mm. long, 4 mm. wide. *Capsules* slender, acuminate, subterrate, spiral, up to 45 cm. long, 4-5 mm. diam., pale brown, dotted with very small tubercles ; septum lenticular in section, longitudinally sinuate ; seeds usually 2.5-3 mm. long, 4-5 mm. wide, and with a wing spread of 1.1 cm., but sometimes a few larger, 4 mm. long, 6 mm. wide, spread 2.5 mm.

NAGA HILLS ; Khonoma, 1850 m., fls. Aug., frt. Nov.-Dec., N. L. Bor 2699. Corolla cream-coloured. Vernacular name: *Thaprüi*. I have only seen a single rather young leaf, detached flowers and one or two cymes in fruit. The description may, therefore, require amplification.

**Isotrema Griffithii** (Hook. f. et Thoms. ex Duchartre) C. E. C. Fischer, comb. nov. [Aristolochiaceae] (Sikkim, Bhutan).—*Aristolochia Griffithii* Hook. f. et Thoms. ex Duchartre in DC. Prodr. 15, 1, 437 (1864).

DELEI VALLEY; 28°21'N., 96°37'E., 2150–2460 m., fls. May, Ward S226: "Twinner among bushes on open ridge at edge of jungle, but in full sun or light. Fls. about 4 in. high, 3 in. across the open mouth; tube a dirty greenish-white, strongly about 12-ribbed, thickly clothed with rather glistening golden brown silky hairs; limb dull-purple outside with reticulate veins, inside covered with sharp projecting dull dark-purple spikes; foetid."

**Iris kumaonensis** Wall. [Iridaceae] (Kashmir to Kumaon).

DELEI VALLEY; 28°21'N., 96°37'E., 3380–4200 m., fls. early June, Ward S281: "In massy clumps on steep gravelly gully-slopes lined with bamboos, along the ridge under bamboos on a rocky outcrop and also on alpine turf slopes. Falls and standards violet; beard white tinged violet; sometimes the whole fl. more purple, the falls mottled; delicately but distinctly fragrant."

**Allium Wallichii** Kunth [Liliaceae] (Gilgit to Sikkim).

DELEI VALLEY; 28°15'N., 96°35'E., 3380–3700 m., fls. just passed, Sept., Ward S663: "In open places on boggy ground or on steep slopes. Fls. violet." 28°15'N., 96°40'E., 3700 m., fls. early Oct., Ward S688: "On sheltered alpine meadow slopes. 2–3 ft. high; fls. palest-purple, almost mauve."

**Nomocharis Souliei** (Franch.) W. W. Sm. et W. E. Evans [Liliaceae] (W. China, S. E. Tibet).

DELEI VALLEY; 28°21'N., 96°37'E., 3700–4000 m., fls. late July, Ward S370: "Under bamboos in black, tenacious loam. 12 in. high; fls. solitary, tepals dull brownish-red with a small yellow area at base, 3 outer shortly saccate at base."

## XXVIII—MISCELLANEOUS NOTES.

**The Correct Name for *Akania Hillii* Hook. f.**—*Akania Hillii* was first published in Volume I, Part i, of Bentham & Hooker's "Genera Plantarum" (p. 409), which bears the date 1862 upon the title-page. An entry in Bentham's MS. diary shows that this part actually appeared not earlier than August 7th of that year. In vol. 17, p. 28, under date 6.8.62, we read: "Out at various com[mission]s—to the Linnean Society—to the Printers to settle accounts for the first part of our Genera which is to be out to-morrow . . . ." The part was reviewed in Gard. Chron. & Agric. Gaz. 1862, no. 36, 838, dated September 6th.

Bentham, in his account of *Akania Hillii* the following year (Fl. Austral. 1, 471: 1863), cited as a synonym *Cupania lucens* F. Muell., and subsequent authors, including the most recent (Harms in Engl. Pflanzenfam. ed. 2, 19b I, 175: 1940), have unanimously followed him.

*Cupania lucens* was published in Mueller's *Fragm. Phytogr. Austral.* 3, 44 (1862). But Fascicle xix, which comprised pages 41-60, was published in July (*vide* p. 60). This gives *C. lucens* at least a week's and at most two months' priority over *A. Hillii*, and the following new combination is accordingly necessary:

***Akania lucens* (F. Muell.) Airy-Shaw, comb. nov.**

*Cupania lucens* F. Muell. *Fragm. Phytogr. Austral.* 3, 44 (Jul. 1862).

*Akania Hillii* Hook. fil. in Benth. et Hook. f. *Gen. Plant.* 1, 409 (inter 7 Aug. et 6 Sept. 1862), et auct. omn.

The genus seems so closely related to *Harpullia*, in spite of the differences of calyx, disk, aestivation, etc., pointed out by Stapf and others, that the wisdom of separating it from the *Sapindaceae* may be doubted. Engler's treatment—placing it next to the *Meliaceae*—to which Harms has been obliged to conform (with evident misgivings), appears to indicate a failure to appreciate the value of *facies* (cf. Sprague in Huxley, *The New Systematics*, 441, 449: 1940).

H. K. AIRY-SHAW.

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***Jacquemontia tamnifolia* (L.) Griseb.\***—Dr. S. J. v. Ooststroom has written to point out that the identity of *J. capitata* with this species was recognized by H. Hallier as long ago as 1899 in his paper "Zur Convolvulaceenflora Amerikas" in *Jahr. Hamburg. Wiss. Anst.* 1898, 16, Beih. 3, p. 28 (1899). He also used it as an example of a species occurring in both South America and Africa. See *Meded. Rijks Herb. Leiden*, 35, 5 (1918).

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**A new *Strychnos* from Thailand.**—In working over the Thai species of *Strychnos* for the *Florae Siamensis Enumeratio* it was found that a specimen collected by Dr. A. F. G. Kerr at Krabi in Southern Thailand represented a new species. This is closely allied to *S. ovalifolia* Wall. of the Malay Peninsula, but has not got the characteristically abbreviated inflorescence of that species. *S. Wallichiana* Benth. is also closely allied, but differs in having constantly oblong leaves and a hairy style.

***Strychnos krabiensis* A. W. Hill, sp. nov. ex affinitate *S. ovalifoliae* Wall.,** a qua inflorescentiis longioribus, floribus paullo majoribus recedit; a *S. Wallichiana* Benth. foliis ellipticis vel ovato-ellipticis, nec oblongis, stylo glabro differt.

*Planta* scandens, lignosa, cortice haud annulata (*vide* Kerr). *Ramuli* teretes, glabri vel primum breviter et patule pubescens. *Petioluli* 1 cm. longi, supra basi crassa articulati, canaliculati, glabri. *Lamina* elliptica vel ovato-elliptica, 8-13 cm. longa, 5-5.75 cm. lata, basi subabrupte angustata vel rotundata, apice acumine 1 cm. longo instructa, e basi valide trinervis, nervis intramarginalibus ut

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\* See K.B. 1940, 63.

secundariis tenuioribus, utrinque glabra. *Inflorescentiae* e cymis paniculatis compositae axillares, efoliatae, ut videtur circiter 7 cm. longae. *Pedunculus* communis 3-3.4 cm. longus, glaber. *Rami inflorescentiae*, ut pedicelli, pilis brevibus fulvo-brunneis patule pubescentes. *Flores* laterales pedicellis 3-4 mm. longis instructi, terminales sessiles. *Calyx* sepalis 5 ovoideo-triangularibus subacutis vel acutis 1.75 mm. longis pubescentibus. *Corolla* 1.3 cm. longa, tubo 1.1 cm. longo intus ad basin versus piloso lobis 5 triangularibus subacutis 2 mm. longis. *Stamina* 8 mm. supra basi tubi affixa. *Antherae* 2 mm. longae, dorsifixae, subsessiles. *Ovarium* globosum, 1 mm. diametro, glabrum; stylus 6.5 mm. longus, glaber.

THAILAND. Puket: Krabi, Ao Luk, c.100 m., in evergreen forest on limestone hill, 10 March, 1930, Kerr 18532. Native name *Y'a mû lek*.

A. W. HILL.

**The New Systematics.\***—This book is a collection of essays by twenty-two contributors on diverse topics directly or indirectly bearing upon the modern problems of taxonomy. Rather less than half of these are mainly botanical. The Editor contributes a helpful introduction which is in some sense a summary of the contents and which serves to bring into focus the rather disconnected chapters of the other contributors.

The objectivity of species, that is stressed by certain of the writers, and the aggregate character of species, emphasised by others, are both important aspects of what Huxley rightly claims are groups that, in the great majority of instances, present no intrinsic difficulty in their separation. The individuals that comprise species are frequently subject to genetic change, and the consequences of such may transcend the limits which one or other biologist regards as justifiably included within their species concept. In this degree the species must be an aggregate depending upon human judgment, although there are many instances where the limits of the specific group are clearly defined alike by geographical and physiological isolation. Yet the normal view of species breaks down where there are hybrid swarms, where apomixis occurs or where descent is reticulate. Thus the necessity arises for the experimental culture of taxonomic units with which W. B. Turrill deals. Most will probably endorse his view that it is only by a combination of all the methods of investigation that there is any hope of obtaining satisfactory evidence on the nature and genesis of taxonomic unity.

J. S. L. Gilmour starts on the high note of epistemology and philosophical promise, but if the fulfilment, as he himself is the first to admit, be somewhat vague, it is well that we should not lose sight of the fact that our only knowledge, even of type specimens, is a complex of sense impressions, the character of which is to

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\* Edited by Julian Huxley. Sponsored by the Association for the Study of Systematics in relation to General Biology. Oxford: at the Clarendon Press, 1940. Pp. viii+583. Price, 21s. net.

some extent conditioned by the individuality of the sensory mechanism.

The phylogenetic basis of classification is claimed both by Sprague and Calman. Gilmour, on the other hand, regards phylogeny as forming a sort of background to natural classification. Much of such difference in point of view may be an outcome of the common confusion of thought between affinities and phylogeny, a distinction with a real difference. A crude illustration will make this point clear. If the problem were to classify a number of human beings of unknown relationships but including members of several families with near and distant relatives, it is quite probable that an intelligent and competent observer would be able, on the basis of resemblances in morphology and behaviour, to place the members of the respective families and some of their nearer relatives into separate groups. One might further draw the not unreasonable inference that these resemblances were indications of probable affinity, but they would afford little if any clue to the phylogenetic relationships. We should be entirely unguided as to whether two individuals exhibiting a certain degree of resemblance were for instance, cousins or an uncle and a nephew. The study of taxonomy is essentially one of the study of differences and resemblances and though such may guide us in assessing affinities it is only rarely in the past that we have obtained any real clue to phylogeny. Occasionally, as W. J. Arkell and J. A. Moy-Thomas in their chapter on "Palaeontology and the Taxonomic Problem" show, fossil evidence may indicate the phylogeny of lineages, but they state that "the major problems of palaeontological taxonomy may be summarised by saying that a phylogenetic and a practical classification are frequently incompatible." Too often our series, if and when established, are capable of being viewed from either direction, and to expect our taxonomic system, which ought to be a summation of all ascertained facts, to be more than an always imperfect, but ever improving, indication of affinities, with but rare adumbrations of phylogeny as a by-product, is to expect a complex differentiating process to be confined to the straight jacket of our preconceptions and prejudices. The contributions of cytology and genetics bid fair to provide far more frequent and reliable indications of immediate phylogeny than in the past, particularly, as Darlington indicates, within the species; but even so, the complexity and variety of the ways in which the hereditary changes come about will maintain the problematic character of phylogenetic speculations.

The examples given in the chapter contributed by Timofeeff-Ressovsky show that the various types of combination and mutation, gene, chromosome or genome, and their experimentally ascertained effects are adequate to account for subspeciation and geographical variation when subject to the action of selection and isolation. This topic is also treated by Muller, who discusses how the investigations on *Drosophila* have shed light on the processes by which

organisms have come to be differentiated and tend to show that species originate by the accumulation of small differences. The distinction which Timofeeff-Ressovsky makes between micro- and macro-evolution is important, since the former can be the subject of experimental test, whereas to attribute the latter entirely to the same causes is at present mere speculative extrapolation that may, or may not, prove justified.

Several of the contributors treat, from various aspects, of the importance of isolation. The effect of geographical isolation is considered in relation to fishes by E. B. Worthington, who stresses the significance of unoccupied ecological niches and the absence of predators. He also draws attention to the higher rate of differentiation of cold-blooded animals in warm waters. Darlington, writing on taxonomic species and genetic systems, deals with the isolating action of internal changes, such as an inverted chromosome segment, and discusses the significance and consequences of structural hybridity. Sewall-Wright from a consideration of certain statistical aspects of mendelian heredity concludes that partial isolation of large interbreeding groups furnishes the most favourable conditions for evolutionary change, and Diver, who writes on the subject of closely allied species living in the same area, holds that random differentiation in small partially isolated populations is the most probable general cause.

The ecological significance of sub-specific groups is considered by Salisbury, who also treats of the effects of plasticity, such as its influence on isolation.

Other contributors deal more especially with aspects which present difficulties in classification. Thus de Beer, treating of the contribution of embryology to taxonomy, points out the special problems that may arise as, for example, where the classification of adult forms is not congruent with that based on the larval stages. Thorp in relation to insects stresses the occurrence of species which are physiologically but not morphologically distinct. Ford discusses polymorphism, whilst Allen discusses wild hybrids. Crane and Vavilov write on the subjects of the origin and taxonomy of cultivated plants, and Ramsbottom deals with the special problems presented by the classification of the Fungi. Finally Smart envisages the practical problems which face the entomologist, and Calman, from his wide experience, lays emphasis upon the rarity of aberrant types.

It is clearly impossible in a short review to do more than indicate the nature of the contents of so varied a series of essays as are comprised in this volume, but it will be obvious from the foregoing that most aspects of taxonomic problems are considered in its pages and that it is a work that should be studied by all who are interested in the classification of either plants or animals.

E. J. SALISBURY.

**Planting Design.\***—This book by the Assistant Professor of Landscape Architecture in the University of Illinois is naturally written for American readers, and though it contains much of value on garden design and planning in relation to colour effects and in connexion with the house itself, much of the work will be more fully appreciated in the United States than in this country, where we seem to manage by our own innate "flair" for garden design and planting to achieve good results without professorial aid!

Following a useful introduction come chapters on "Color Theory" and "The Use of Color" in which much sound advice on the proper blending of colours is given and suggestions as to the plants to be used to produce the desired results. Then come chapters on "Texture," "The Attributes of Mass" and "Mass: grouping and arrangement," which deal with the many elusive qualities of light and shade, harmony in design, shapes of trees and shrubs and the pattern produced by well-blended colour, whether of flowers or different shades of foliage.

Part II deals with the ecological factors of soil and climate which should be of great value to American readers and also useful to horticulturists in this country. Part III is headed "Applications," and the themes considered are "Planting about Buildings" and "Public Plantings," both chapters being well illustrated; these show that Professor Robinson has a fine sense of the relation that should exist between the layout of the garden and the house to which it leads up.

The book concludes with a series of interesting "problems" which deserve careful study by anyone who may be designing a garden, especially in relation to its surroundings.

**The Scientific Principles of Plant Protection.†**—It is interesting to note the publication of a third edition of Martin's well known "Scientific Principles of Plant Protection" only four years after the appearance of the second (K.B. 1936, 444). The new edition follows the same lines as the last, the sequence and titles of the chapters being the same as before, and the book only a few pages longer. Whilst the book is mainly concerned with the principles of controlling fungus diseases and insect pests of plants and the soil in which they grow by chemical methods, there are important chapters dealing with Plant Resistance, Biological Control, Traps, and the Elimination of Infection Centres. Recent developments in these subjects have been fully summarized, whilst the text of the second edition has been shortened in places in order to make room for the fresh information. It is impossible to note

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\* By Florence Bell Robinson. Published by the McGraw-Hill Publishing Company Ltd., Aldwych House, London, W.C.2. Pp. 215. Illustrated. Price 15s. net.

† "The Scientific Principles of Plant Protection, with special reference to Chemical Control." By Hubert Martin. London, Edward Arnold and Co., 1940. Pp. x+385. Price 22s. 6d. net.



in detail all of the changes which have been made, but some of the more comprehensive alterations are in the sections dealing with the "spreaders" and "stickers" used in spray fluids, the copper fungicides, the measurement of the degree of toxicity, and the spread of virus diseases. Those who have attempted to destroy slugs in their gardens will almost certainly agree with the recommendation to use metaldehyde ("Meta") for this purpose rather than the sulphates which have hitherto been commonly employed. It is rather curious, however, that the elimination of slugs should still be discussed in a chapter on "weed killers." It is to be hoped that the new edition of Mr. Martin's book will be accessible to all those who are interested in cultivating crop plants under the best possible conditions, the importance of which is, if possible, even greater now than in time of peace.

C. R. METCALFE.

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Mr. C. E. C. FISCHER, who was appointed to the post of Assistant for India in the Herbarium at Kew on January 26th, 1925 (see K.B. 1925, 41), retired from this post on reaching the age limit on June 30th, 1940. He is succeeded by Mr. K. N. KAUL, M.Sc., whose selection for this post, by the Government of India, was announced in the Bulletin, 1939, 313.

Since the announcement of Mr. Kaul's appointment, the Government of India decided to retain Mr. Fischer's services as Assistant for India until the end of June, 1940, so that Mr. Kaul might have the full benefit of his knowledge of the Indian Flora and of the historic Indian collections in the Herbarium.

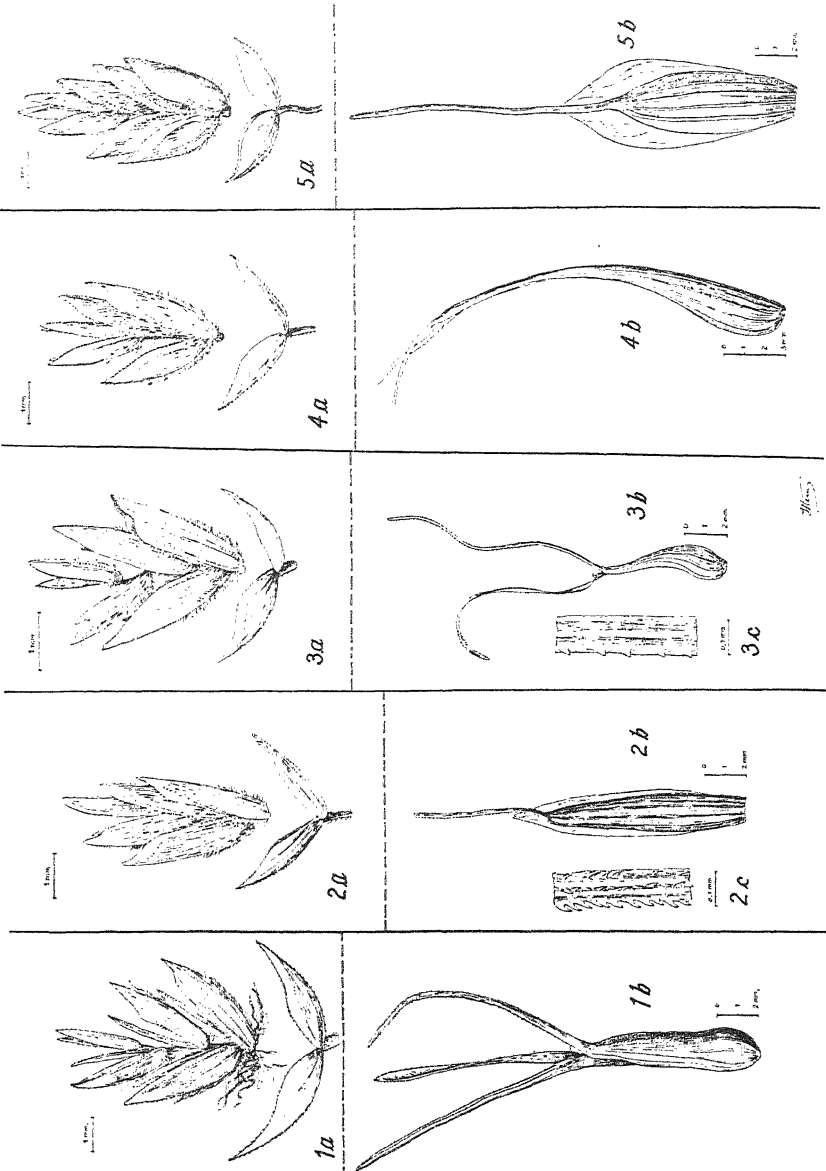
Mr. Fischer entered the Royal Indian Engineering College, Coopers Hill, as a Probationer for the Indian Forest Service in 1892, and on passing out at the end of 1895, he joined the Service in the Madras Presidency. During his time in India he was a constant collector of botanical specimens. After a short term at Dehra Dun in 1907 as acting Forest Entomologist, he studied Plant Pathology at Munich and London while on study leave in 1908-9. From 1915 to 1917 Mr. Fischer was Principal of the Madras Forest College. In 1920 he became Conservator of Forests and remained in that post until he left India at the end of 1923. He finally retired from the Indian Forest Service in 1926.

After the death of Mr. J. S. Gamble in 1925, Mr. Fischer undertook the completion of the Flora of the Presidency of Madras, which had been begun by Mr. Gamble in 1915. Parts 8, 9, 10 and 11 were prepared by Mr. Fischer, the final part appearing in February, 1936.

During his service of more than fifteen years at Kew, Mr. Fischer's kindness and enthusiasm have endeared him to all his colleagues, and they wish him many years of activity and happiness in his retirement.



PLATE VII



1. *Poa bulbosa* L.
  2. *P. sinaica* Steud.
  3. *P. Eigii* Feinbr.
  4. *P. Hackeli* Post.
  5. *P. Timoleontis* Heldr.
- a. Spikelet.    b. Bulb or sheath or radical leaf with ligula.  
c. Portion of lamina showing scabrosity.

# BULLETIN OF MISCELLANEOUS INFORMATION No. 7 1940 ROYAL BOTANIC GARDENS, KEW

XXXV — POA SERIES BULBOSAE ROSHEV. OF  
PALESTINE AND SYRIA. NAOMI FEINBRUN (Hebrew  
University, Jerusalem).

The series *Bulbosae* has recently been distinguished from the Sect. *Bulbophorum* Asch. et Gr. by Roshevitz (1934). This series comprises those species of *Poa* whose sheaths of radical leaves are thickened to form small bulbs tunicated by sheaths of preceding years. The region of concentration of species which comprise this group is the Irano-Turanian (Eig, 1931). While the European species of Sect. *Bulbophorum* have been studied in some detail (Ascherson and Graebner, 1900; Hegi, 1907; Achtaroff, 1939), little was known of the Asiatic group of species until rather recently. In the Flora URSS (1934), a revision of the Russian species of this group is given by Roshevitz. No revision, however, of the species of the Near East has been made since Boissier (1884). These are insufficiently known both taxonomically and phytogeographically. We may cite the following passage on the S. European *P. Timoleonitis* Heldr. (*P. bulbosa* ssp. *Timoleonitis*) by Achtaroff (1939, 130): "Meiner Schaetzung nach muss diese Unterart als das letzte und das xerophilste Glied in der phylogenetischen Entwicklung der Sektion *Bulbophorum* betrachtet werden."

A revision of this group from Palestine and Syria seems thus to be desirable.

The species belonging to this group and reported from Palestine are as follows (Post, 1896, 1933; Eig, 1932):—(1) *P. bulbosa* L., (2) *P. sinaica* Steud., (3) *P. Hackeli* Post.

For Syria two more species are recorded:—(4) *P. macroglossa* Hack. and (5) *P. Timoleonitis* Heldr.

However, since Post no new data have been obtained on the last four species.

This revision is based on the abundant material preserved at the Herbarium of the Hebrew University, Jerusalem, and collected by the staff of the Botanical Department during phytosociological and phytogeographical studies conducted especially in the steppe and desert sections of Palestine, Syria and Iraq. We were also able to examine the material found at the Dinsmore Herbarium (Jerusalem) and the Post Herbarium (Beirut).\*

\* The author wishes to express her gratitude to Mr. J. E. Dinsmore for placing at her disposal the material of his Herbarium and for help in procuring the type specimens of Post's Herbarium.

KEY TO POA SER. BULBOSAE ROSHEV. OF PALESTINE AND SYRIA.

1. Rhachis of spikelet always bearing long fleece at the base of the lower pales. Height of plant 15–30 cm. .... **P. bulbosa** L.  
Rhachis of spikelet destitute of long fleece at the base of the lower pales, or, when bearing a few long hairs, height of plant 35–50 cm. .... 2
2. Ligules of radical leaves and tips of membranous sheaths enveloping the bulbils, 2–4 mm. long, produced above the tufts; blades densely scabrous at the margins and along prominent nerves (fig. 2b, c) ..... 3  
Ligules of radical leaves and tips of membranous sheaths short, generally not produced; blades sparsely scabrous at the margins (fig. 3b, c) ..... 4
3. Sheaths of radical leaves obovate, scarcely 1 cm. long; their ligules about 4 mm. long, generally entire, continued as broad margins of the sheath (fig. 5b). Plant 10–20 cm., rarely 25 cm. high. Spikelets 6–10-flowered. .... **P. Timoleonis** Heldr.  
Sheaths of radical leaves usually more than 1 cm. long, oblong; ligules about 2 mm. long, generally fringed; plants 15–25 cm. high and then 4–5-flowered, or tall plants, 30–35 cm. high, with 6–7-flowered spikelets (Moab) ..... **P. sinaica** Steud.
4. Plants 10–25 cm. high forming dense and short tufts; glumes 2–2.5 mm. long; panicle 2.5–5 cm. long; sheaths of radical leaves about 1 cm. long. .... **P. Eigii** Feinbr.  
Plants 35–50 cm. high growing in small, mostly isolated tufts; lower glumes 3–3.5 mm. long; panicle 5–10 cm. long; sheaths of radical leaves 2–3 cm. long. .... **P. Hackeli** Post

ENUMERATION.

**Poa bulbosa** L. Specimens seen\*:—Palestine: Upper Galilee: Ramah (1927 Smoly); Birket-Ram (1925 Smoly). Mt. Carmel, near Haifa (1923 E). Judean Mountains: Jerusalem, Mt. Scopus (1931 Amdursky); Jerusalem, Gehenne (1924 E); Wadi Shiban (1930 FZ); Motsa (1924 E); env. of Bethlehem (1924 E). Amman: env. of Ain Sueli (1929 EZ). Moab: Medaba (1911 Meyers & Dinsmore). Syria: Amanus Mts., Col de Beylan, 700 m. (1932 Delbes); sortie Est d'Antioche, 100 m. (1935 Delbes); ca. Aleppo (1931 Z); Lebanon, Brummana (1900 Warburg); Antilebanon (1930 Warburg).

The outstanding differential characteristic of this species, as compared with other species of this group, is the presence of long crisp fleece on the rhachis of the spikelet at the base of the lower pales

\* Abbreviations:

Collectors: E—Eig, F—Feinbrun, G—Grizi, Z—Zohary.

Herbaria: DH—Dinsmore Herbarium, American Colony, Jerusalem.

PH—Post Herbarium, Beirut.

When not otherwise mentioned the specimens are from the Herbarium of the Hebrew University, Jerusalem.

(fig. 1a). *P. bulbosa* is a rather low grass (15–30 cm. high), forming small, more or less isolated tufts, with inflated bulbils at the base (fig. 1b). In Palestine, this species shows forms transitional to *P. Hackeli* Post (see below). Viviparous forms are rather frequent.

According to its geographical range this species is a plant of the Euro-Siberian-Boreo-American, Mediterranean, and Irano-Turanian regions (Eig, 1932). Roshevitz (1934) reports this species from European Russia, W. Siberia, and the Caucasus (Euro-Siberian-Boreo-American region), and from Middle Asia (Irano-Turanian region). In Palestine and Syria, however, we found it only in the eu-Mediterranean territory. There it generally appears in the last degradation stages of the constantly destroyed shrub associations, and occasionally in somewhat ruderal localities. Eig, Feinbrun, and Zohary (1934) regarded it chiefly as an Irano-Turanian species. This was based on the fact that they comprised under the name *P. bulbosa* four different species, *P. bulbosa*, *P. Hackeli*, *P. sinaica*, and *P. Eigii*. The associations in which *P. bulbosa* is given by them as principal indicator refer to the last two species which are actually Irano-Turanian. Only the following passage can be referred chiefly to the true *P. bulbosa*: "In Mediterranean Palestine *P. bulbosa* is a leading plant of an association of a very limited extension, but the genesis of this association reveals rather a secondary origin."

It is a matter of doubt whether the *P. bulbosa* of the United States is conspecific with the European plant. It is most probably a separate species, differing in height (it is 30–60 cm. tall) and in several other characteristics (Halperin, 1931, Hitchcock, 1935). Halperin, who gives a detailed description of the Californian *P. bulbosa*, does not mention the fleece of the rhachis. The species is given as introduced from Europe. If so, it would be an interesting case of a new type developed during a few hundred of years at most.

**P. Hackeli** Post. Specimens seen :—Palestine : Judean Mountains : Solomon's Pools (1886 Post, type !, PH) ; Jerusalem (1924 E) ; Wadi Rijan (1930 FZ) ; Kiryath Anavim (1923 E). Acre Plain : Jidro (1927 Smoly). Sharon : Herzlia to Arsuf (1926 Z). Shefelah : Gedera (1927 EFZ) ; Shekhunath Borokhov (1927 EFZ). Near Negeb : Tel Milh (1922 E) ; Tel Arad (1922 E). Syria : Col de Beylan (1932 Delbes) ; ca. Riha (1931 Z) ; ca. Aleppo (1931 Z) ; Bshetfin (1899 Post, PH). S. Turkey : Aintab (1887, Post, type !, PH) ; Midyat (Post, type !, PH).

Post (1897) distinguishes this species from *P. bulbosa* as follows : "Species *P. bulbosae* L. affinis praesertim glumella carina marginibusque rigidule pectinato-ciliata basi non protrahendo-lanata distincta (In *Poa bulbosa* cilia mollia, basi convexa, lana protrahenda)." The most important difference thus would be the long fleece at the base of the lower pales of *P. bulbosa*. The examination of the three type specimens of *P. Hackeli* Post (1, Solomon's Pools ; 2, Aintab ; 3, Midyat) from Post's Herbarium (Beirut) showed, however, that their florets were not altogether destitute of long

crisp hairs. At the base of the 1-3 lower florets we found 2-3 long hairs, while the upper ones were destitute of them or bore 1-2 shorter hairs. These hairs could be easily distinguished from the rather long cilia of the keel and margins. In our Herbarium, however, we found many species of *P. Hackeli* completely destitute of fleece on the rhachis (fig. 4a). On the other hand we possess other specimens forming a series of transitions from the true *P. bulbosa* to *P. Hackeli*.

Another important characteristic of *P. Hackeli* is its height. Post gives it as "planta sesquipedalis," i.e. about 50 cm. high and so are the type specimens from Aintab and Midyat (S. Turkey), while that of Solomon's Pools (Palestine, S. of Jerusalem) is only about 35 cm. high; the specimens of our Herbarium are 35-50 cm. high. As given by the majority of European Floras, the height of *P. bulbosa* is 15-30 cm. Our specimens of *P. bulbosa* correspond, therefore, to these measurements. However, we also possess a few specimens transitional both in presence of fleece and height between *P. Hackeli* and *P. bulbosa*, so that it is difficult to decide in which of the two species they should be classed. These transitional forms may have been produced at the meeting place of *P. bulbosa* and *P. Hackeli* by hybridization, or else *P. Hackeli* may be regarded as a more or less recent derivative of *P. bulbosa* still connected by transitional forms with its maternal species. At all events *P. Hackeli* seems to be nearer *P. bulbosa* than other Palestinian and Syrian species of the series *Bulbosae* Roshev. All other species of this region are completely destitute of fleece.

Other important characteristics of this species are: growth in small tufts remote from one another and almost destitute of remnants of preceding years (however it is not annual as described by Post); culms geniculate at base; radical leaves with very short not produced ligules and their sheaths 2-3 cm. long (fig. 4b) and their blades about 5 cm. long, generally scabrous only at the margins; panicle 5-10 cm. long.

*P. Hackeli* is an East-Mediterranean species. In Palestine it is chiefly restricted to non-eu-Mediterranean parts of the country. It occurs on the one hand on the light soils of the coastal plain, where it is rather common in natural non-Mediterranean associations (as *Helianthemum elliptici* and others). On the other hand, it is found in the eastern and southern parts of the Judean Mountains, bordering on the Irano-Turanian Judean Desert and Negeb.

**Poa Eigii** Feinbr., sp. nov.; affinis *P. bulbosae* L., *P. Hackeli* Post, et *P. sinaicae* Steud., sed a prima flosculis lana non connexis, caespitibus densis compactis, a secunda plantis minoribus, vaginis foliorum basaliū brevioribus residuis vaginarum vetustarum dense obtectis, paniculis brevioribus, a tertia ligulis foliorum basaliū brevioribus, vaginis haud membranaceo-marginatis, laminis mollioribus glabris margine scabriusculis, glumis acuminatis, glumellis brevioribus differt.

Perennis, dense caespitosa; culmi erecti, 10–25 cm. alti, basi bulbiformi-incrassati et foliorum vaginis residuis dense tecti; folia convoluta, tenuia, glabra, margine scabriuscula, radicalia numerosa, 2–4 cm. longa, ligulis brevibus (1–1.5 mm. longis), vaginis 1–1.5 cm. longis saepissime violaceis marginibus membranaceis destitutis; panicula anguste oblongo-lanceolata, 2.5–5 cm. longa, ramis brevibus strictis; spiculae confertae, ovatae; flosculi 3–5, lana non connexi; glumae subaequales, ovato-oblongae, acuminatae, 2–2.5 mm. longae; glumella oblonga, acutiuscula, saepe breviter mucronata, carina et margine dense et longe ciliata. Spiculae in gemmas foliiferas saepe mutatae.

Specimens seen:—Palestine: Judean Desert; km. 18 on the Jerusalem-Jericho road (1935 EZG, type!); Ain Hod (1935 EZ); Tal'at ed Dam (1935 EZ). Near Negeb: E of Tel-Arad (1934 EFZ); Qurnub to Beersheba (1934 EFZ).

This species differs from *P. bulbosa* L. chiefly in the lack of connecting fleece and in its dense compact tufts forming great patches or surfaces. From *P. Hackeli* Post it differs in the smaller size of the plant; in the short sheaths of the radical leaves, which are densely covered by the residues of sheaths of the preceding years; in the shorter panicle; the smaller lower glume (2–2.5 mm., not 3–3.5 mm. long). From *P. sinaica* Steud. it can be distinguished by short, generally not produced ligules of the radical leaves, not continued as a broad membranous margin of the sheath (fig. 3b); by softer and glabrous leaves, scabridulous only at the margins (fig. 3c); by acuminate, more unequal glumes and shorter lower pales (fig. 3a).

Phytogeographically this species is to be regarded as belonging to the Irano-Turanian element. It is an endemic possessing a restricted area (only Judean Desert and Near Negeb), but there it is very important phytosociologically. It is an important component of several Irano-Turanian plant associations and forms their spring aspect (as for instance in *Nocaea mucronata*—*Poa Eigii* association, *Ononis Natrix*—*Poa Eigii* association, etc.). Its high sociability is most remarkable. The plant vegetates for a very short season; the green colour that its tufts give to the mountain slopes at the beginning of the rainy season soon changes into a yellowish colour.

***P. sinaica* Steud.** The confusion surrounding this species was probably caused by Boissier (1884). His description of the lower pales is erroneous and runs as follows: "... glumella . . . undique plus minusve pruinoso-scabida," and further: "Ab affini *P. bulbosa* foliis tenuissimis, panicula angustiore, flosculis lana destitutis, glumellis undique pruinosis vel glabratis nec lineatim sericeis distincta. *P. concinna* Gand. . . differt . . . glumella ad carinam et margines sericea" (p. 606). This is rather puzzling because the original diagnosis of Steudel (1855, 256) is very clear on this point: "flosculis . . . margine dorsoque pilosis caeterum glabris." Probably



in accordance with Boissier, Schweinfurth described his var. *aegyptiaca*, reported by Muschler (1912, 135) as follows. "This variety differs from the typical form by . . . the flowering glumes with dense ciliate nerves." It is obvious that the var. *aegyptiaca* Schweinf. is identical with the type of *P. sinaica* Steud.

In Post's Herbarium, Beirut, there are several sheets of this species. One of them was determined by Hackel who, however, considered this species as "eine schwache Art" (in the letter to Post mentioned below). The eminent agrostologist probably did not have at his disposal a sufficient number of specimens and ignored the phytogeographical importance of this species. Now there is no doubt that *P. sinaica* is a good species; within this species we were even able to distinguish several paramorphs. It is also recognised as such by Roshevitz (1934).

The most characteristic features of this species are the following : —(1) Ligules of radical leaves and tips of membraneous sheaths usually enveloping the bulbil, produced above the tuft; length of ligule about 2 mm. (2) Blades of radical leaves very narrow, convolute, densely scabrous at the margins and along the prominent nerves of the lower surface (fig. 2c). (3) Bulbils oblong, often scarcely inflated below, densely covered by residues of sheaths of preceding years. (4) Tufts rather dense; culms generally not geniculate.

The following paramorphs were distinguished :

**P. sinaica** Steud. ssp. **typica** Feinbr. ssp. nov.

Plantae 15–25 cm. altae; flosculi 4–5; paniculae ramuli breves.

var. **aegyptiaca** Schweinf.

Glumellae margine dorsoque ciliatae.

Some of the specimens seen : Sinai : Near Tih, Escarpement (1882 Post, HP). Palestine : Moab : S. of Ziza, 700 m. (1937 Dinsmore No. 10571, HD). Edom : Ain Musa, near spring (1929 EZ); 40 km S. of Ma'an, Nubian sandstone (1929 EZ); Aneze to Ma'an (1929 EZ); 12 km. S. of Jurf ed Derawish, 1000 m., Artemisietum *Herbae albae* (1936 EFZ); 9 km. N. of Aneze, 1050 m., *Halogetonum alopecuroides* (1936 EFZ). Syria : Ain el Wa'ul to Ain el Beidha; Nebk to Karyetein; Karyetein to Ain el Wa'ul (1890 Post, det. Hackel, PH); Tell esh Shamat, 87 km. E. of Damascus; 366 km. E. of Damascus; 538 km. E. of Damascus; Wadi Muhammadi, 105 km. W. of Ramadi; 47 km. E. of Ramadi (all : 1933 EZ); 65 km. E. of Deir es Zor (1939 Dinsmore, HD); Jebel Mukeibra, 30 km. W. of Soukhne, 800 m., 17 km. W. of Hussetché, 320 m.; 120 km. S. of Homs, 1430 m. Iraq : 9 km. N. of Tauq (betw. Baquba and Kirkuk); 140 km. N.E. of Deltawa, 180 m.; 35 km. N.W. of Kirkuk; 21 km. N.W. of Kirkuk; 15 km. N. of Altum Keupri, 320 m.; Jebel Atshan (E. of Mosul), 500 m.; 10 km. N.E. of Tel Abu Dahir, 400 m.; 35 km. N.W. of Mosul, ca. 540 m.; 2–3 km. N. of Balad Sindjar, 600 m. (all : 1933, EZ).

var. **glabrescens** *Feinbr.* var. nov.

Glumella tota glabra.

Specimens seen: Palestine: Edom: 23 km. S.W. of Ma'an (1936 EFZ type); Ain Musa, near spring (1929 EZ).

ssp. **moabitica** *Feinbr.* ssp. nov.

Planta elata (30–50 cm.); foliorum radicalium vaginae 3–4 cm. longae; panicula diffusa, usque ad 13 cm. longa et 5 cm. lata; rami elongati, inferiores 5–6 cm. longi, pedunculi ramorum parte reliqua saepe longiores. Spiculae 6–7-florae; glumella glabra.

Specimens seen: Palestine: Moab: Ziza to Um el Ammud (1929 EZ type); Amman to Ziza (1929 EZ).

The geographical area of *P. sinaica* is wide, and extends over Galala of Egypt, Sinai Peninsula, the steppe parts of Transjordan, Eastern Syria, and the Syrian Desert up to Iraq. It probably continues through Persia and is reported from Transcaucasia and Russian Middle Asia. *P. sinaica* is a typical steppe plant and, in the Near East at least, is very important phytosociologically. In the *Poa bulbosa*-*Carex stenophylla* and *Phlomis Bruguieri*-*Poa bulbosa* associations mentioned by Eig, Feinbrun, and Zohary (1934), the name *Poa bulbosa* must be replaced by *Poa sinaica*. The same relates to the *Poa bulbosa*-*Carex stenophylla*-*Ranunculus asiaticus* association characteristic of oviposition fields of the Moroccan locust. (Eig, 1935).

**P. Timoleonitis** *Heldr.*—The record of this species from Syria in Post's Flora is based upon one specimen from El Beidha to El Jebah (Syrian Desert). This specimen, marked No. 5, was sent for determination to Hackel who designated it in his letter to Post as "genau gleich den Original-Exemplaren." Comparing this specimen with the specimens of *Heldreich* 104 we find that it is rather untypical as to its ligules, forming a transition to *P. sinaica* from which *P. Timoleonitis* was never differentiated. The differential characteristics of *P. Timoleonitis* are: (1) Ligules of radical leaves longer (3–4 mm.) and broader than in *P. sinaica* (fig. 5b). (2) Sheaths of radical leaves obovate, not oblong, with broader membranous margin. (3) Leaves setaceous, narrower than in *P. sinaica*. (4) Spikelets 6–10-flowered. (5) Height of plant 10–25 cm.

Phytogeographically *P. Timoleonitis* differs from *P. sinaica*, which is an Irano-Turanian species. The area of *P. Timoleonitis* is the Balkan Peninsula reaching as far as S. Dobrogea in the north; it grows often in community with *P. bulbosa* (Hermann, 1939). The isolated station of this species in the Syrian Desert is rather curious. Further findings are necessary to confirm its occurrence there.

At the same time there is evidence for assuming that the so-called *P. macroglossa* Hack. from Aintab (S. Turkey) is the viviparous form of *P. Timoleonitis*. We shall now discuss this species.

*P. macroglossa* was published first in Post's Flora (1896) with reference to a letter of Hackel ("Hackel in letter"). The letter,

dated 1890, is found attached to the type specimen of this species in Post's Herbarium. The respective passage may be cited here : "Die *Poa* von Aintab ist sehr interessant. Mit *P. bulbosa* ist sie nicht nahe verwandt, sondern mit *P. alpina* L., doch scheint sie mir auch von dieser durch die sehr grosse gezaehnte Ligula hinlaenglich verschieden zu sein. Jedoch kann ich auf Grund des einzigen Halmes kein sicheres Urtheil abgeben, umsoweniger als das uebersandte Exemplar kein normales, sondern *vivipar* ist. Aber auch hierbei verhaelt es sich anders als *P. alpina* und *P. bulbosa*. Denn bei letzteren entspringt die aus der Spelze hervorstehende Laubblattspreite (lamina) aus der Spitze, bei Ihrer *Poa* aber auf dem Ruecken. Ich glaube demnach wohl annehmen zu duerfen, dass es sich hier um eine neue Art handelt, welche ich provisorisch (wegen der grossen Ligula) *P. macroglossa* nenne ; allein ich wuerde dieselbe nicht eher publizieren, bis ich davon mehr Material und namentlich auch Exemplare mit entwickelten *Blueten* (nicht Brutknospen, propagula, vulgo "flores vivipari") gesehen haben werde. Vielleicht gelingt es Thoren naechstes Jahr, solche zu erlangen." However, as testified by the remark of Post (1896 and 1933), normal specimens of the species have never been collected. He wrote : "The only specimens thus far seen are the so-called viviparous forms." No other specimens are found in Post's Herbarium. As emphasised by Hackel, it is impossible to establish a species upon a few viviparous specimens. To ascertain if the curious ligules of the viviparous bulbils occur in *P. sinaica*, we examined many viviparous specimens of this species, but found none similar to those of Aintab. However, the description of the viviparous form of *P. Timoleontis* given by Hermann (1939) corresponds fairly well to *P. macroglossa*. It is curious that on one of the two sheets of *P. macroglossa* we found the following remark made by Post : "Barbey in Plantae Postianae, 14, says that it is *Poa Timoleontis*, Heldr. forma *vivipara*" (cf. Pl. Postianae, fasc. 1, p. 14). *P. macroglossa* must be thus regarded as conspecific with *P. Timoleontis*. This widens the geographical range of this species further east to S. Turkey and the Syrian Desert. More detailed investigation of the plant in this part of its area, especially with regard to its phytosociology, would be desirable.

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## XXXVI—SOME FUNGI FROM AFGHANISTAN. ✓

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In the summer of 1939 I paid a hurried visit, lasting about six weeks, to Afghanistan. The trip, which began on the 25th of June, covered nearly 2700 miles in the northern, eastern and southern parts of the country. The north-eastern part, comprising the Pamirs and Nuristan, the central part known as the Hazarajat and the western part, comprising the province of Herat, could not be visited as the roads had been damaged and bridges washed away by the unprecedented floods of the previous spring.

Afghanistan is for the most part a mountainous country, but in the north stretches a vast prairie-like region, the southerly extension of the great central Asian Steppe. The mountains are mostly barren and vegetation is rather scarce. In the valleys which are traversed by the rivers, however, principal among which are the Kabul and the Kunduz, intensive cultivation is carried on by the people. The rivers are in spate in the late spring and early summer, but for the rest of the year they are usually dry. Annual precipitation is chiefly in the form of snow in winter; rain is scarce.

Conditions on the whole apparently did not favour the growth and development of fungi, and the damage due to them in fields, orchards and vineyards was negligible. Both because of the scarcity of fungi and the hurry with which the journey was made, there was little time to make either close observations or any extensive collections. The few collections that were made have been

identified, and, as they may be of interest, are listed below. They are deposited in the *Herbarium Cryptogamicum Indiae Orientalis* of the Imperial Agricultural Research Institute, Delhi.

I wish to place on record my gratitude to Mr. A. M. Mustafa, Agricultural Officer, Baluchistan, and the leader of the party that visited Afghanistan, for the interest he took in my work and the help he rendered. I also wish to thank Mr. Mohammad Taslim of the Mycology section of this Institute for the aid he gave in making the identifications.

### Phycomycetes.

#### PERONOSPORALES.

*Cystopus candidus* (Pers.) De Bary.

On leaves and stems of *Brassica Napus* L. Char-e-khar.

*Cystopus Ipomoeae-panduranae* (Schw.) Stevens and Swingle.

On leaves of *Ipomoea* sp. Paghman.

*Plasmopara viticola* (Berk. et Curt.) Berl. and De Toni.

On leaves of *Vitis vinifera* L. (Cult.) Kandahar.

*Peronospora aestivalis* Sydow.

On leaves of *Medicago* sp. Phul-i-kumri.

*Peronospora Viciae* (Berk.) De Bary.

On leaves of *Vicia* sp. Paghman.

### Ascomycetes.

#### PERISPORIALES.

*Uncinula necator* (Schw.) Burr.

On leaves and berries of *Vitis vinifera* L. Kandahar.

#### DOTHIDEALES.

*Phyllachora Cynodontis* (Sacc.) Niessl.

On leaves of *Cynodon Dactylon* (L.) Pers. Kalat-e-gilzai.

#### HYPOCREALES.

*Ustilaginoidea virens* (Cooke) Takahashi.

In ovaries of *Oryza sativa* L. Laghman valley.

### Basidiomycetes.

#### USTILAGINALES.

*Entyloma Oryzae* Sydow.

On leaves of *Oryza sativa* L. Laghman valley.

*Sphacelotheca Sorghi* (Link) Clinton.

In ovaries of *Sorghum halepense* (L.) Pers. Mazar-i-shariff.

*Tilletia foetida* (Wallr.) Liro.

In ovaries of *Triticum vulgare* Vill. Road-side between Mukur and Kalat-i-galzai. Leg. T. Ahmad.

*Urocystis Tritici* Koernicke.

On leaves of *Triticum vulgare* Vill. South of Kabul, on Ghazni road.

*Ustilago Cynodontis* P. Henn.

In inflorescence of *Cynodon Dactylon* (L.) Pers. Baglan.

*Ustilago Hordei* (Pers.) Lagerh.

In ovaries of *Hordeum vulgare* L. (Cult.) Khanabad, Chardeh-ghorbund.

*Ustilago Kolleri* Wille.

In ovaries of *Avena sativa* L. Aibak.

*Ustilago nuda* (Jens.) Rostrup.

In ovaries of *Hordeum vulgare* L. (Cult.) Bamian.

*Ustilago Tritici* (Pers.) Rostrup.

In inflorescence of *Triticum vulgare* Vill. Baglan, Balkh, Khanabad, Ghazni, Mukur.

#### UREDINALES.

*Aecidium Mori* Barclay.

On leaves of *Morus alba* L. Isstalif, Char-e-khar.

*Melampsora Lini* (Pers.) Lév.

On leaves and stems of *Linum usitatissimum* L. Bhutkak, Baglan.

*Puccinia artemisiella* Sydow.

On *Artemisia* sp. Kunduz.

*Puccinia Cynodontis* Desm.

On leaves of *Cynodon Dactylon* (L.) Pers. Ghazni.

*Puccinia glumarum* (Schm.) Eriks. et Henn.

On leaves and culms of *Triticum vulgare* Vill. Mukur, Bamian, Ghazni.

*Puccinia graminis* Pers.

On culms of *Avena sativa* L. Chardeh-ghorbund. On culms, leaves, and glumes of *Triticum vulgare* Vill. Bhutkak, Ghazni, Balkh, Tashqurkhan, and Bamian.

*Puccinia Taraxaci* Plowr.

On leaves of *Taraxacum officinale* Weber. Kabul.

*Puccinia triticina* Eriks.

On leaves and culms of *Triticum vulgare* Vill. Chardeh-ghorbund.

*Uromyces Fabae* (Pers.) De Bary.

On leaves and pods of *Pisum sativum* L. Kabul.

*Uromyces Hobsoni* Vize.

On stems, petioles and leaves of *Jasminum* sp. Paghman.

#### Fungi Imperfecti.

##### MONILIALES.

*Alternaria Solani* (Ell. et Mart.) Jones et Grout.

On leaves of *Solanum tuberosum* L. Kabul, Gulbagh.

*Cercospora beticola* Sacc.

On leaves of *Beta vulgaris* L. Baglan.

*Cercospora concors* (Casp.) Sacc.

On leaves of *Solanum tuberosum* L. Kabul.

*Cercospora neriella* Sacc.

On leaves of *Nerium odorum* Soland. Rishkhor (Kabul).

*Helminthosporium Oryzae* Breda de Haan.

On leaves and glumes of *Oryza sativa* L. Laghman valley.

*Helminthosporium teres* Sacc.

On leaves of *Hordeum vulgare* L. Ghazni.

#### MELANCONIALES.

*Septoria Tritici* Desm.

On leaves of *Triticum vulgare* Vill. Kunduz.

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### XXXVII — CONTRIBUTIONS TO THE FLORA OF BURMA: XVIII.\* C. E. C. FISCHER.

The regions quoted in round brackets are those from which the species concerned has been reported previously.

**Anemone vitifolia** Ham. [Ranunculaceae] (Sikkim, Mishmi).

Seinghku Valley, 2150 m., fls. early Aug. *F. Kingdon Ward* 7245: "In meadow. Sepals white, slightly flushed purple on reverse; anthers golden."

**Ranunculus sceleratus** Linn. [Ranunculaceae] (N. India, N. Temperate zone).

Nsop, 150 m., fls. and frt. end March, *Ward* 6606: "In wet sand in the open bed of the river, growing with *Polygonum*. Fls. butter-yellow."

**Ilex Hookeri** King [Aquifoliaceae] (Sikkim).

Seinghku Valley, 2935 m., fls. early June, *Ward* 6860: "Small shrub in dense thickets, open situations on the steep sheltered face of the valley. Fls. cream."

**Dipentodon sinicus** Dunn [Celastraceae] (W. China).

Seinghku Wang, 2300 m., fls. end May, *Ward* 6779: "In thickets on the edge of the 'dry' forest. Fls. cream, young anthers crimson." Near Kan-fan, 26°16' N., 98°47' E., 2770 m., *Forrest* 26540: "In mixed forests on the W. flank of the divide. Fls. grey-green." 25°58' N., 98°29' E., 2460 m., fls. May, *Forrest* 26561: "In open thickets by streams in the hills. Fls. green-white." N.E. Burma, 2450 m., *Forrest* 2448, without date or precise locality: "In mixed forests."

In the original description of this genus and species (K.B. 1911, 310) Dunn refers to the difficulty of discovering its affinity. He placed it provisionally in the family *Celastraceae*. I am of opinion that it is better fitted into the *Samydaceae* (*Flacourtiaceae*, *sensu* Pflanzenfamilien), and akin to the genus *Casearia*. In this opinion I receive some support from Dr. C. R. Metcalfe, who kindly undertook to make anatomical comparisons between this plant and a

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\* Continued from K.B. 1940, p. 186.

species of *Casearia* and of one species of each of the genera of *Celastraceae* quoted by Dunn. He finds the anatomical characters of *Dipentodon* very similar to those of *Casearia* but still more so to those of *Perrottetia*, and it seems probable that the latter genus also should be transferred to the *Flacourtiaceae*. The question, however, demands much further investigation and until this has been done the genus may be left where Dunn placed it.

The leaves are sometimes ovate and the base may be cuneate or emarginate. The perianth of 10 segments appears to me to be inseparable into sepals and petals. The disk lines the perianth-tube.

**Photinia rufa** C. E. C. Fischer, sp. nov. [Pomaceae]; prope *P. mollem* Hook. f. ponenda, tomento rufo, corymbis minoribus atque magis compactis, calycis dimidio superiore glabro, disco glabro differt.

A small tree; branchlets and older twigs nearly black (when dry); twigs of the year densely fulvous-tomentose. Leaves elliptic, acuminate, base cuneate, 4-6.2 cm. long, 1.4-2.3 cm. wide, midrib slightly impressed above, raised below as are the 5-8 parallel, nearly straight primary nerves, ultimate network very fine, above olivaceous (when dry) and glabrous except that occasionally the midrib near the base is pubescent, pale below and densely fulvous-tomentose on the midrib and nerves, less so between them, margins evenly denticulate except for the basal third; petioles 4-10 mm. long, channelled above, densely fulvous-tomentose; stipules absent, presumably early caducous. Corymbs terminal on the twigs, up to 3.5 cm. diam., many-flowered; rhachis, its branches and pedicels more or less densely rufous-tomentose; pedicels 2-5 mm. long; bracts linear-ensiform, acuminate, 5 mm. long, caducous; bracteoles filiform. Calyx turbinate, rufous-tomentose in lower half, glabrous above, 3.5 mm. long; lobes triangular-lanceolate-ovate, subacute, 1.5 mm. long. Petals broadly obovate or trapezoid, obtuse, base narrowed but hardly clawed, 3.5 mm. long, reflexed in flower. Stamens about 20; filaments subulate, 2-2.5 mm. long, glabrous; anthers subglobose. Disk thin, lining the calyx-tube. Ovary 2-celled; crown glabrous; ovules 2 in each cell; styles 2, very shortly united at the base, 3 mm. long. Fruit not seen.

Seinghku Wang, 2770 m., fls. May, Ward 6756: "In the tangle-wood forest. Fls. white; fragrant."

**Saxifraga nigroglandulosa** Engl. et Irmsch. [Saxifragaceae] (Yunnan).

Seinghku Valley, 28°10' N., 97°20' E., 3400-3700 m., fls. early Oct., Ward 7544: "On rocky shrub-clad slopes. Fls. bright-orange with darker spots." 4100 m., fls. early Oct., Ward 7565: "Commonest rock Saxifrage at 3700-4100 m., forming clumps amongst stones. Fls. either bright-orange with darker spots or bright-sulphur with orange spots."



**Saxifraga stella-aurea** *Hook. f. et Thoms.* [Saxifragaceae] (Sikkim, Tibet).

Seinghku Wang, 3400–3700 m., fls. late July, *Ward* 7206: “On boulder slopes. Fls. bright-yellow with orange spots.”

**Osbeckia yunnanensis** *Franch. ex Craib* [Melastomaceae] (Yunnan).

Seinghku-Adung confluence, 1230 m., fls. Aug., *Ward* 7287: “In thickets; 2–3 m. high. Fls. pinkish-purple.”

**Trichosanthes Wallichiana** *Wight* [Cucurbitaceae] (Sikkim, Khasia, Malaya).

Seinghku Valley, 2150 m., fls. early Aug., *Ward* 7248: “Climber in thickets; keeping in the open. Fls. pink.”

**Heracleum candicans** *Wall.* [Umbelliferae] (Kashmir to Kumaon).

Seinghku Valley, 28°10' N., 97°20' E., 3700–4000 m., fls. and frt. Oct., *Ward* 7561: “Amongst mossy boulders and stones in dry gullies. Fls. white or tinged purple.”

**Oenanthe Thomsoni** *C.B. Clarke* [Umbelliferae] (Sikkim to Khasia).

Seinghku Valley, 2150 m., fls. early Aug. *Ward* 7254: “In damp, boggy meadow. Fls. white; scented.”

**Pleurospermum dentatum** *Benth.* [Umbelliferae] (Kumaon to Sikkim).

Seinghku Valley, 28°10' N., 97°20' E., 3400–3700 m., fls. and frt. Oct., *Ward* 7560: “In colonies amongst moss-covered stones in the steep rock-bed of a torrent (now dry). Fls. white; whole plant scented.”

**Helwingia himalaica** *Hook. f. et Thoms.* [Araliaceae] (Sikkim to Khasia, W. China).

Seinghku Wang, 1550 m., fls. May, *Ward* 6714: “Small shrub with weak, drooping branches; epiphytic on trees in the jungle by the river. Leaves highly polished; flowers green tipped with purple, anthers cream.”

**Macropanax undulatum** *Seem.* [Araliaceae] (Sikkim to Assam).

Nogmung Nam Tisaing, 450–670 m., and by the Nam Tamai at 1240 m., fls. April–May, *Ward* 6644: “Long, limp scrambler, stems many feet in length growing up through thickets in the jungle. Fls. pale-green.”

**Schefflera glauca** (*Clarke*) *Harms* [Araliaceae] (Assam).

Seinghku Valley, 2150–2800 m., fls. Sept., *Ward* 7503: “Tall, slim, unbranched, palm-like tree of the upper temperate rain-forest. Fls. cream.”

**Leycesteria glaucophylla** *Hook. f.* [Caprifoliaceae] (Sikkim).

Seinghku Wang, 2150 m., fls. end May, *Ward* 6777: “Small straggling bush in alder copse in the stony river-bed. Fls. pale-sulphur or greenish.”

**Viburnum erubescens** Wall. [Caprifoliaceae] (Kumaon to Bhutan, Dekkan, Ceylon).

Seinghku Wang, 2600 m., fls. May, *Ward* 6744 : "Shrub or small tree on open bracken-clad slopes or in bamboo thickets. Fls. hanging in bunches, chalk-white ; slightly fragrant."

**Viburnum tricostatum** C. E. C. Fischer, sp. nov. [Caprifoliaceae] ; prope *V. Davidii* Franch. atque *V. cinnamomifolium* Rehd. ponendum, ab utroque foliis chartaceis, inflorescentiae rhachi pubescente, corolla tubulari differt.

A tree 7-10 m. high ; twigs terete, the terminal sulcate, brownish when dry, sometimes with a purplish tinge, glabrous, sparingly minutely pustulate. *Leaves* opposite, chartaceous, elliptic or elliptic-oblong, caudate-acuminate, base narrowed and rounded, sometimes slightly inequilateral, 9-19 cm. long, 3-5 cm. wide, 3-ribbed from 2-6 mm. above the base, the ribs running to the apex, sometimes in a continuous gentle curve and at others indented at the junction with the very few usually oblique primary nerves, a number of finer nearly horizontal veins between, ultimate network small, glabrous, olivaceous (when dry) above with the ribs, nerves and reticulations slightly impressed, yellowish-green below and abundantly but obscurely punctate, margins entire or with a few minute, distant teeth in the apical third ; petioles 1.3-2.5 cm. long, narrowly channelled above, often pustulate. *Corymbs* terminal, umbel-like, 3-4 cm. wide ; peduncles 1.5-2.5 cm. long, sparingly pubescent as are its branches, primary branches 4-7, 1.4-2 cm. long, secondary 3-4, 6-10 mm. long, both furrowed (at least when dry) ; pedicels 2-3 mm. long ; bracts linear 5 mm. long ; bracteoles appressed to the ovaries, oblong, truncate, 1.5 mm. long. *Ovary* turbinate or oblong, angled, 1.7 mm. long, 1-celled. *Calyx* very short ; lobes 5, short, broad, obtuse. *Corolla* tubular ; tube 4.5 mm. long ; lobes 5, rounded, 0.7 mm. long, 1.5 mm. wide. *Stamens* 5, inserted about  $\frac{1}{3}$  above the base of the corolla ; filaments strap-shaped, 4.5 mm. long ; anthers oblong, pendent, 1.5 mm. long, exserted. *Style* broadly conical, 1 mm. long ; stigmas 2. *Fruit* not seen.

Seinghku Wang, 2000 m., fls. end May, *Ward* 6802 : "In thickets. Corolla violet, anthers violet."

**Brachytome Wardii** C. E. C. Fischer, sp. nov. [Rubiaceae] ; *B. Wallichii* Hook. f. valde affinis, ramulis foliisque infra puberulis, inflorescentia pubescente, cymis brevioribus atque magis compactis, corollis brevioribus atque latioribus differt.

A small *shrub* ; lateral twigs sulcate on the upper side near the leaves, brownish, rather densely brown-puberulous, especially at the apex. *Leaves* elliptic-oblong to oblanceolate or obovate, rather abruptly caudate, narrowed to the slightly inequilateral base, when one of the pair of leaves is suppressed the other is broad and equilateral, 17-20 cm. long, 5.5-7.5 cm. wide, midrib and 10 pairs of primary nerves prominent below, the latter anastomosing near the

margins, joined by usually straight or oblique, infrequently branched veins, when mature glabrous above, puberulous on the nerves below, dark-brown or olivaceous above when dry, paler below; petioles 5–10 mm. long, of the single leaves the longer, densely puberulous. *Cymes* in the axils of suppressed leaves, up to 2.5 cm. long; basal bracts small, loosely enfolding the peduncles; peduncles up to 5 mm. long, with its branches, pedicels, bracts and bracteoles densely appressed fuscous-pubescent; bract narrowly ensiform, finely acuminate, 2 mm. long; pedicels 3.5 mm. long; bracteoles like the bracts, minute. *Ovary* subglobose or oblong, 4 mm. long, puberulous. *Calyx* cupular, 2 mm. long, puberulous; teeth 5, minute, distant. *Corolla* rather broadly funnel-shaped; tube 6.5 mm. long, 3.5 mm. diam. at the mouth, glabrous outside, villous in the upper half within; lobes 5, overlapping clockwise in bud, subcircular, 2.3 mm. diam. *Stamens* 5, inserted above the middle of the corolla-tube; filaments very short; anthers linear, included, 3.3 mm. long, dorsifixed below the middle. *Crown* of ovary cushion-shaped, 0.7 mm. high. *Style* stout, 2.5 mm. long, stigmatic lobes 2, elliptic, subacute, 3.5 mm. long. *Fruit* not seen.

Seinghku-Adung confluence, 1380 m., fls. May, *Ward* 6702: "In thickets as jungle undergrowth. Fls. cream; slightly scented."

***Lasianthus Wardii* C. E. C. Fischer et K. N. Kaul**, sp. nov. [Rubiaceae]; *L. tubifero* Hook. f. valde affinis, ramulis fistulosis hirsutis, foliis subtus magis hirsutis, petiolis brevioribus hirsutis, stipulis hirsutis, calyce brevior differt.

A shrub; twigs compressed, fistular, fuscous hairy. *Leaves* chartaceous, distichous, elliptic-oblong to oblanceolate-oblong, caudate-acuminate, base cuneate, 12–17 cm. long, 3.5–6 cm. wide, midrib and 7 pairs of primary nerves raised below, dark-olivaceous (when dry) and glabrous above, brown and fuscous-hairy, especially on the nerves, below; petioles 5–10 mm. long, hairy; stipules short, broadly ovate, cuspidate, margins toothed or not. *Inflorescence* of few-flowered, sessile or shortly peduncled fascicles. *Ovary* cupular, brown-hairy, 4 mm. long, crown cushion-shaped, 1.2 mm. high, 5-loculae; ovules oblong, compressed. *Calyx* brown-hairy on both sides; tube very short; lobes 5, oblong, obtuse, 3 mm. long. *Corolla* tubular below, funnel-shaped above, short brown-hairy outside; tube 1.6 cm. long, 5 mm. diam. at the mouth, whitish- or brownish-pilose in the apical two-thirds within; lobes 5, triangular-ovate, subacute, 4.5 mm. long. *Stamens* 5, in the corolla throat; filaments 1 mm. long; anthers included, linear, 2.5 mm. long, basifixed. *Style* slender, widened at the apex, 7.5 mm. long, minutely brown-puberulous; stigmas 3, sometimes 5, linear, 1.4 mm. long. *Fruit* not seen.

Nam Tanaï, 920–1070 m., fls. early May, *Ward* 6679: "Hanging over cliffs in the river bed. Fls. white or pale-purple, upper face of corolla-lobes purple.

**Leptodermis gracilis** C. E. C. Fischer, sp. nov. [Rubiaceae]; prope *L. lanceolatum* Wall. ponenda, ramulis cinereis gracilioribus, foliis fere glabris, pedunculis floribusque brevioribus, bracteolarum dentibus brevioribus trinerviis differt.

A shrub; branches long, thin, eventually drooping, ashy. Leaves opposite, membranous, elliptic to lanceolate, acute, base cuneate, more or less decurrent, 1.4–3.5 cm. long, 5–13 mm. wide; primary nerves 4–6 pairs, glabrous except for the sparingly hispidulous midrib and sometimes near the margins above, olivaceous (when dry) above, paler below, margins hispidulous-ciliolate; petioles 2–6 mm. long; stipules interpetiolar, long cuspidate from a broad base, 3 mm. long, minutely puberulous and ciliolate. Inflorescence terminal and from the upper axils, forming a thyrse; peduncles striate, angular, 3.5 mm. long, minutely puberulous; flowers sessile in threes; bracts narrowly elliptic-lanceolate, acute, 4 mm. long, ciliolate; bracteoles united into a 2-toothed, chartaceous sheath, tube 2.5 mm. long, teeth ovate, apiculate, 1 mm. long, 3-veined. Ovary turbinate, strongly 5-ribbed, 1.2 mm. long. Calyx campanulate; tube 0.7–1 mm. long; lobes 5, oblong, rounded or truncate, 1 mm. long, ciliolate. Corolla narrowly funnel-shaped; tube very slender, 8 mm. long, pubescent in the upper  $\frac{2}{3}$  within; lobes 5, ensiform, subacute, 1.5 mm. long. Stamens 5; anthers sessile, inserted on the throat of the corolla, included, linear, 1.5 mm. long. Style very slender, shortly exserted; stigmas 3, filiform, 1–1.5 mm. long, papillose. Capsules linear-oblong, 5-valved, 5 mm. long. Seeds fallen.

Zayul River: Kahao, 1500 m., fls. July, Ward 7182: "Compact, almost spiny shrub on the open hillside; lanky in shaded thickets. Fls. white or purple."

**Dipsacus inermis** Wall. [Dipsacaceae] (Kashmir to Bhutan).

Seinghku Valley, 28°10' N., 97°25' E., 2770–3100 m., fls. Oct., Ward 7603: "Meadow plant, 1–1½ m. high. Fls. cream with purple stamens."

**Morina betonicoides** Benth. [Dipsacaceae] (Sikkim).

Seinghku Wang, 28°8' N., 97°24' E., 3400 m., fls. early July, Ward 7033: "On granite boulders in the open valley. Fls. purple, darker in the centre; very fragrant." Ward 7065: "On grassy banks with *Nomocharis* and *Iris*. Fls. white, tinged purple."

**Veronica himalensis** Don [Scrophulariaceae] (Himalayas, Nepal to Sikkim, S. Tibet).

Seinghku Wang, 28°8' N.: 97°24' E., 3400 m., fls. end June, Ward 7008: "On steep earth-bank facing South. Fls. blue."

**Edgeworthia Gardneri** Meissn. [Thymelaeaceae] (Nepal to Bhutan, China, Japan).

Seinghku Wang, 2770 m., fls. May, Ward 6758: "On very steep, rocky, rather open slopes where there are no trees, only thickets;

common in the valley below at 1250 m., but there the fls. are long since over. Fls. at first golden-yellow, later fading to white; leaves appear after the fls. are over."

## XXXVIII—NEW SPECIES AND RECORDS FROM TIBET : II.\*

The regions quoted in round brackets are those from which the species concerned has been previously reported.

**Geum elatum** Wall. [Rosaceae] (Kashmir to Sikkim).

Hills East of Yatung, 3700 m., fls. June, *B. J. Gould* 2096.

**Potentilla latipetiolata** C. E. C. Fischer, sp. nov. [Rosaceae]; *P. articulatae* Franch. similis sed planta minor, caulibus simplicibus, foliolis cum petiolis latioribus haud articulatis, bracteolis oblongis differt.

A perennial herb; root woody, 3–4 cm. long; caudex short, together with the stems concealed by the densely imbricate leaves, 1–2 cm. long. Leaves digitately 3-foliolate; leaflets rigid, sessile, linear-oblong, obtuse, 5–6.2 mm. long, 1–2 mm. wide, pubescent and with an apical tuft of hairs, margins revolute (at least when dry), 1-ribbed; petiole 4–8 mm. long, 2–3 mm. wide, including the adhering bases of the stipules; stipules adhering to within 1 mm. of the leaflets, free portion linear-ensiform, up to 3.3 mm. long, pubescent. Flowers very few, axillary, solitary; peduncles 8 mm. long, sparingly hairy; bracts 2, opposite, linear-oblong, acute, 6 mm. long, thinly hairy; pedicels 3 mm. long, thinly hairy. Sepals 5, ovate, acute, 4 mm. long, greenish, purple-splashed. Bracteoles 5, oblong, obtuse, 2–3.5 mm. long. Petals 5, nearly circular, not clawed, 6 mm. long, apex entire, emarginate or 3-lobulate, golden-yellow. Stamens 20 or more; filaments slender, 2–2.5 mm. long, glabrous; anthers small. Disk white-villous. Carpels many, oblong, gibbous on one side, 1.3 mm. long, green, the apex often purple, glabrous; style lateral from close to the apex, slender, 2 mm. long, hooked at the apex; stigma capitate, minute. Fruit not seen.

Rama to Dumpa Gompa, 4900 m., fls. end June, *Gould* 2272.

In the specimens the individual plants are separate, in nature they may be aggregated to form cushions; the leaves form a globose or oblong mass around the stem 1.5–2 cm. long and about 1.5 cm. in diameter.

**Potentilla purpurea** Royle [Rosaceae] (N.W. Himalayas).

Rama to Dumpa Gompa, 4900 m., fls. end June, *Gould* 2261.

**Sanguisorba filiformis** (Hook. f.) Hand.-Mazz. [Rosaceae] (Sikkim).

Tuna to Khambu, 4900 m., fls. July, *Gould* 2349.

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\* Continued from K.B. 1940, 269.

**Saxifraga subsessiliflora** Engl. et Irmsch. [Saxifragaceae] (Sikkim).

Rama to Dumpa Gompa, 4900 m., fls. end June, Gould 2271.

**Saxifraga tangutica** Engl. [Saxifragaceae] (Sikkim).

Melong Gompa, 4900-5230 m., fls. early July, Gould 2244.

**Saxifraga tentaculata** C. E. C. Fischer, sp. nov. [Saxifragaceae]; *S. flagellari* Willd. affinis sed caulibus glabris, foliis ad basin et apicem aggregatis, petalis multo brevioribus 5-nerviis distat.

A stoloniferous herb; rootstock not seen; stem solitary, slender, 2.5-6 cm. high, usually narrowly winged below the leaves, glabrous, reddish-purple (when dry). *Stolons* axillary, several from each stem, mostly from above its middle, filiform, up to 22 cm. long, purplish, glabrous. *Leaves* aggregated at the base and apex of the stem, scattered along the intervening space, oblong or elliptic-oblong or spatulate, obtuse or subacute, sessile, basal and median 4-8 mm. long, glabrous, the apical usually longer, up to 1.2 cm. long and 3-4 mm. wide, purplish and increasingly ciliate with short gland-tipped hairs as they ascend the stem. *Flowers* either one only terminating the stem or with a second terminating a short lateral shoot; pedicels 1.5-8 mm. long, that of the lateral the shorter, terete, purplish, bearing short purple-gland-tipped hairs. *Hypanthium* widely campanulate, 1.5 mm. long, sparingly glandular-hairy like the pedicel. *Sepals* 5, oblong to broadly triangular-ovate, obtuse, unequal, 2.5-3 mm. long, 1.5-2.8 mm. wide, dark green with narrow purplish margins, minutely ciliolate, the ciliola sometimes purple-gland-tipped, 3-nerved. *Petals* 5, broadly obovate, rounded, 3-3.2 mm. long, 2-2.6 mm. wide, 5-nerved, yellow. *Stamens* 10; filaments linear-ensiform, 1.8 mm. long; anthers subglobose, 1 mm. diam. *Ovary* broadly conical above the hypanthium, 2 mm. long; carpels free for about half that length; style very short. *Capsules* not seen.

Tibet-Bhutan frontier, Phari to Tsethanka, 4600 m., fls. July, Gould 2384.

**Saxifraga tsangchanensis** Franch. [Saxifragaceae] (Yunnan).

Tibet-Bhutan frontier, above Tsethanka, 4600 m., fls. July, Gould 2395.

In the tips of the leaves and of the sepals there is a single round gland sunk in the tissue of the upper surface. This is not mentioned in published descriptions. I have not seen the type, but these glands are present in specimens in the Kew Herbarium identified as this species.

**Epilobium sikkimense** Hausskn. [Onagraceae] (Sikkim).

Khambu, 4300 m., fls. July, Gould 2357.

**Cavea tanguensis** (Drumm.) W. W. Sm. et J. Small [Compositae] (Sikkim).

Rama to Melong Gumpa, 4600 m., fls. early July, *Gould* 2326 ;  
Melong Gumpa, 4900–5200 m., *Gould* 2233.

**Lactuca macrantha** *C. B. Clarke* [Compositae] (Sikkim).

Gautsa to Yatung, 3700 m., fls. July, *Gould* 2417.

**Saussurea gossypiphora** *Don* [Compositae] (Garhwal to Sikkim).

Linji La, 5200 m., fls. early July, *Gould* 2297.

**Primula atrodentata** *W. W. Sm.* [Primulaceae] (Sikkim).

Rama to Dumpa Gumpa, 4900 m., fls. end June, *Gould* 2248.

**Primula capitata** *Hook.* [Primulaceae] (Sikkim, Bhutan).

Khambu, 4300 m., fls. July, *Gould* 2354.

**Primula concinna** *Watt* [Primulaceae] (Sikkim).

Above Gautsa, 4000 m., fls. June, *Gould* 2113.

**Primula elongata** *Watt* [Primulaceae] (Sikkim).

Tatung to Lachung La, 3700 m., fls. early June, *Gould* 2051 ;  
East of Yatung, 3700 m., fls. June, *Gould* 2073.

**Primula muscoides** *Hook. f. ex Watt* [Primulaceae] (Sikkim).

Linji La, 5200 m., fls. early July, *Gould* 2282.

**Primula obliqua** *W. W. Sm.* [Primulaceae] (Sikkim).

East of Yatung, 3700 m., fls. June, *Gould* 2074.

**Primula pusilla** *Wall.* [Primulaceae] (Kumaon to Sikkim).

Linji La, 5200 m., fls. early July, *Gould* 2283.

**Primula Roylei** *Balf. f. et W. W. Sm.* [Primulaceae] (Nepal, Sikkim).

Yatung to Lachung La, 3700 m., fls. early June, *Gould* 2036,  
2050 ; Yatung, 3200 m., fls. June, *Gould* 2067, 2069.

**Primula sapphirina** *Hook. f. et Thoms.* [Primulaceae] (Sikkim).

Above Gautsa, 4000 m., fls. June, *Gould* 2112.

**Primula sikkimensis** *Hook.* [Primulaceae] (Sikkim, W. China).

Yatung to Gautsa, 3550 m., fls. June, *Gould* 2099 ; Tuna to  
Khambu, 4900 m., fls. & frt. July, *Gould* 2339 ; Tremo La, 4750 m.,  
fls. July, *Gould* 2376.

**Primula tenuiloba** (*Hook. f.*) *Pax* [Primulaceae] (Sikkim).

Linji La, 5200 m., fls. early July, *Gould* 2280.

**Gentiana depressa** *D. Don* [Gentianaceae] (Garhwal, Nepal, Sikkim).

Near Phari, 4450 m., fls. Sept., *Gould* 1631.

As practically no dimensions have been given in the published descriptions it is thought advisable to give them here: *Surculi* up to 10 cm. long, the leaves on them ovate, up to 5 mm. long. *Leaves* on flowering stems up to 1.7 cm. long and 1.2 cm. wide.

*Calyx-tube* 1-1.2 cm. long ; lobes 7.5-9 mm. long, 8.5-9.5 mm. wide, overlapping, margins shortly decurrent on the tube, keel decurrent. *Corolla-tube* 3 cm. long, 1.6 cm. wide at the mouth ; lobes 5 mm. long, 6 mm. wide ; folds about half as long. *Stamens* inserted 1-1.2 cm. above the base of the corolla-tube ; filaments 9-12 mm. long ; anthers 4 mm. long, versatile. *Stipe* of ovary 6-8 mm. long. *Ovary* 1-1.2 cm. long ; style 5.5-6.5 mm. long ; stigmas linear-lanceolate, 3.5 mm. long, puberulous on the upper half.

**Swertia multicaulis** *D. Don* [Gentianaceae] (Nepal, Sikkim).

Phari to Tremo La, 4600 m., fls. and frt. June, *Gould* 2166 ; Linji La, 5200 m., fls. early July, *Gould* 2304.

**Chionocharis Hookeri** (*C. B. Clarke*) *I. M. Johnst.* [Boraginaceae] (Sikkim).

Linji La, 5200 m., fls. early July, *Gould* 2284.

**Pedicularis Bietii** *Franch.* [Scrophulariaceae] (W. China).

Melong Gompa, 4900-5200 m., fls. early July, *Gould* 2241 ; Rama to Dumpa Gompa, 4900 m., fls. end June, *Gould* 2279.

**Pedicularis Oederi** *Vahl* [Scrophulariaceae] (Kashmir to Sikkim).

Phari to Tremo La, 4600 m., fls. June, *Gould* 2157.

**Picrorhiza Kurrooa** *Benih.* [Scrophulariaceae] (Kashmir to Sikkim).

Rhamme, 4600 m., frt. early July, *Gould* 2337.

**Salix Lindleyana** *Wall. ex Hook. f.* [Salicaceae] (Sikkim).

Phari to Tremo La, 4600 m., fls. June, *Gould* 2167.

**Salix Serpyllum** *Anderss.* [Salicaceae] (Sikkim).

Khambu, 4300 m., fls. July, *Gould* 2362.

**Smilacina purpurea** *Wall.* [Liliaceae] (Garhwal to Sikkim).

East of Yatung, 3700 m., fls. June, *Gould* 2180.

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### XXXIX—PLANTS NEW TO ASSAM: XIII.\*

C. E. C. FISCHER.

**Lobelia deleiensis** *C. E. C. Fischer*, sp. nov. [Lobeliaceae] ; a *L. erecta* Hook. f. et Thoms. foliis acuminatis, inflorescentia haud racemosa, pedicellis elongatis, calycis segmentis linearibus multo longioribus differt. A *L. longipedicellata* C. E. C. Fischer foliorum nervis numerosioribus, calycis segmentis linearibus, antheris hispidis distat. A *L. Wardii* C. E. C. Fischer foliis majoribus ellipticis nervis numerosioribus, calycis segmentis multo longioribus, corolla breviori latiore distincta.

A lolling herbaceous plant up to 1 m. high, branched above, rootstock not seen ; branchlets fistular, sulcate, glabrous. *Leaves* elliptic or elliptic-lanceolate, caudate or caudate-acuminate, base

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\* Continued from K.B. 1940, 198.



tapering, 6.5–15 cm. long, 1.6–4 cm. wide, primary nerves 9–11 pairs, ultimate network small, margins crenate-denticulate, uppermost small but not bracteiform; petioles 4–10 mm. long. *Flowers* axillary, solitary; pedicels slender, 2–4 cm. long, curving. *Ovary* cupular, 4–6 mm. long. *Calyx-tube* very short; segments linear, slender, spreading, 1.6–2 cm. long. *Corolla* cream-coloured; 3 median lobes lanceolate, caudate, 8 mm. long, 2 lateral linear-ensiform, caudate, 1.2 cm. long. *Stamens* a little shorter; filaments glabrous; 3 upper anthers slightly hispid, 2 lower bearded at the tip. *Style* columnar, villous round the shortly 2-fid stigma. *Ripe fruit* not seen.

Delei Valley, 28° 21' N., 96° 37' E., 1850–2150 m., fls. July, *F. Kingdon Ward* 8460. "Forms clumps in open glades in the temperate rain forest."

***Lobelia longipedicellata*** C. E. C. Fischer, sp. nov. [Lobeliaceae]; a *L. erecta* Hook. f. et Thoms. foliis glabris, inflorescentia haud racemosa, pedicellis elongatis, calycis segmentis multo longioribus, antheris glabris distat.

A *herb* up to 1 m. high; rootlets rather thick, tomentose; stem simple, fistular, striate, 5 mm. diam. *Leaves* (radical not present) narrowly lanceolate or oblanceolate, acuminate, the lowest sometimes rounded, base cuneate or tapering, 5–15 cm. long, 1.3–3.5 cm. wide, one or two basal and a few apical shorter than the rest, primary nerves 5–7 pairs, indistinct, forming a sharp angle with the midrib, much reticulated, glabrous, minutely translucent-dotted, margins glandular-denticulate; petioles very short, one or two basal up to 1 cm. long, semiamplexicaul. *Flowers* solitary, axillary, but absent from the uppermost leaves which do not become bracteiform; pedicels up to 8 cm. long, sigmoidally curved, usually bearing 2 caducous bracts near the base or above, but below the middle, linear, 2–15 mm. long. *Ovary* turbinate; 6–7 mm. long. *Calyx-tube* short; lobes 5, linear-lanceolate, obtuse or subacute, 1–3 cm. long, 3.5–5.5 mm. wide, margins often with a few small glandular teeth. *Corolla* 1.5–1.8 cm. long, dark magenta-purple, puberulous below; 3 median lobes subequal, lanceolate, acute, 7–8 mm. long, 2 lateral linear, 1.1 cm. long. *Stamens* 1.4 cm. long; filaments minutely ciliolate; anthers glabrous. *Style* nearly as long as the stamens, stout, pubescent below the subacutely 2-fid stigma. *Capsule* subglobose, 8–9 mm. diam.

Delei Valley, 28° 21' N., 96° 37' E., 1850–2450 m., fls. & frt. July, *Ward* 8443. "On south-facing scarped bracken-clad slopes where it grows in clumps."

***Lobelia Wardii*** C. E. C. Fischer, sp. nov. [Lobeliaceae]; a *L. erecta* Hook. f. et Thoms. foliis acuminatis, floribus haud racemosis, pedicellis multo longioribus, calycis segmentis linearibus distincta; a *L. longipedicellata* C. E. C. Fischer calycis segmentis brevioribus linearibus, corolla graciliore, antheris pilosis distat.

A perennial *herb*; rootstock not seen; shoots long, trailing or arching, fistular, puberulous upwards. *Leaves* lanceolate, acuminate or caudate-acuminate, base cuneate, sometimes inequilateral, 4–8 cm. long, 1–2 cm. wide, upper reduced but not bracteiform, primary nerves 5–6 pairs, ultimate network fine, hispidulous on the nerves above, paler and glabrescent below, margins denticulate; petioles 4–8 mm. long. *Flowers* solitary, axillary; pedicels slender, up to 3.7 cm. long. *Ovary* cupular, 4–6 mm. long. *Calyx* tube very shallow; segments linear, 4–5.5 cm. long, usually recurved at the apex. *Corolla* pure violet, 2.2 cm. long; 3 median lobes broadly ovate, apiculate, 6.5 mm. long, 5.5 mm. wide, pilose within, lateral lobes ensiform, acuminate, 1–1.2 cm. long. *Staminal column* glabrous; anthers pubescent, the 2 lower bearded at the apex. *Style* columnar, shorter than the stamens, pubescent around the dome-shaped, 2-fid stigma. *Fruit* not seen.

Delei Valley, 28° 21' N., 96° 37' E., fls. July, Ward 8445. "On the edge of thickets in the undergrowth."

**Cassiope Wardii** Marq. [Ericaceae].

Previously known only from S.E. Tibet.

Delei Valley, 28° 21' N., 96° 37' E., 3400–3700 m., fls. early June, Ward 8285. "On an outcrop of granite rock along the bamboo-clad ridge, in moss. Erect undershrub; fls. scarcely open, milk-white."

**Clerodendrum lasiocephalum** C. B. Clarke [Verbenaceae].

This species was described by Clarke (Fl. Brit. Ind. 4, 594) on a single sheet collected by Griffith in the Mishmi country. The specimen is in fruit and Clarke had not seen the plant in flower, consequently the description is brief and hardly adequate. Further specimens having been received at the Kew Herbarium a fuller description is thought to be desirable. Curiously enough two of these later collections were made by Clarke himself in May and July 1885, apparently after he had composed his account of the *Verbenaceae*, which was published in August of the same year. The following description has been compiled from all the sheets available, including 3 from Upper Burma which are not again referred to here.

A *shrub* up to 2 m. high; flowering twigs (lower parts not seen) terete, at first brown-tomentose, becoming merely pubescent by fruiting time. *Leaves* from broadly elliptic-ovate with a rounded or cuneate base to broadly ovate-cordate with a nearly truncate to distinctly cordate base, acute or acuminate, 6–25 cm. long, 5–21 cm. wide, at first greyish-brown tomentose on both faces, later only pubescent, primary nerves 5–8 pairs, looped and joining close to the margins, with the midrib prominent below, margins shortly ciliate, from slightly sinuate to finely or coarsely and irregularly sharply-dentate; petioles 2–15 cm. long, indumentum as of the leaves. *Panicle* sessile or on a stout peduncle up to 4 cm. long, up to 7 cm. across and as long, congested; bracts narrowly elliptic-lanceolate

to oblanceolate, finely acuminate, shortly petioled, tomentose to pubescent, up to 3 cm. long; pedicels 5–12 mm. long. *Calyx* narrowly funnel-shaped, pubescent; tube 7.5–8 mm. long; lobes 5, ensiform, finely acuminate, 1–1.5 cm. long. *Corolla* narrowly cylindric, wider at the base, suddenly much expanded at the apex; tube 2.5–3 cm. long; lobes 4, broadly obovate, rounded, 9–10 mm. long, 7 mm. wide. *Stamens* 4, inserted above the middle of the corolla-tube, long exserted; filaments filiform, 3.5–4 cm. long; anthers linear, cells acute and divaricate at the base, 3–4 mm. long. *Disk* narrowly turbinate, 1.5 mm. long, 4-ribbed and very shortly 4-toothed, forming a pediment to the ovary. *Ovary* oblong, depressed, slightly compressed, 1.5–2 mm. long; style filiform, shortly exserted, apex acutely 2-fid. *Drupe* 6 mm. diam., red.

Mishmi, *Griffith* Kew Dist. No. 6055. Dupla, *Booth* (without no. or details). Khasia Hills, Nungpo, 460 m., fls. May, C. B. *Clarke* 38106A, "shrub 5 ft.; corolla white; bracts and head purple-red." Shillong, 1300 m., fls. July, *Clarke* 44144A. Naga Hills, Khonoma, 1540 m., fls. April, *N. L. Bor* 2724, "very foetid."

## **XL — NEW OR LITTLE-KNOWN PLANTS FROM SOUTHERN INDIA: XIII.\***

***Salacia Gambleana*** M. M. *Whiting et K. N. Kaul*, nom. nov. [Celastraceae].

Gamble gave the name *Salacia Talbotii* (K.B. 1916, 133) to a plant of North Kanara collected by W. A. Talbot in 1886 and 1888 (Anishi Ghat—nos. 1217 and 1361 in Herb. Kew.), overlooking E. G. Baker's *Salacia Talbotii* published in his Catalogue of Nigerian Plants 1913, p. 19, collected by P. A. Talbot, no. 1687. The North Kanara plant has therefore been re-named *Salacia Gambleana*.

***Ruellia Beddomei*** C. B. *Clarke* [Acanthaceae].

This species has hitherto been found only in the Central Provinces of India.

Billigirirangan Hills, 4th mile on Punjur Ghat, 1150 m., fls. and frt. Sept., *E. Barnes* 2189, 2190. "Under the shade of bamboo on rocky slope. Corolla white."

***Chlorophytum acaule*** *Baker* [Liliaceae].

This species was founded on a single sheet, holding 3 plants with capsules only, collected by Jerdon in the "East Indies" without precise location (see Journ. Linn. Soc. 15, 327). No further specimens being available when vol. VI of the Fl. Brit. Ind. was published, Hooker placed it (p. 336) among the "doubtful and imperfectly known species." Professor E. Barnes has now sent a specimen of this plant to Kew, collected in the Elagiri Hills of the North Arcot District at 1075 m., fruiting in Dec. (*E. Barnes* 2210).

\* Continued from K.B. 1939, 662.

This plant also bears only capsules, but, fortunately, Prof. Barnes has plants growing at Tambaram and has seen flowers though somewhat imperfect ones. A fuller description has therefore been drawn up from these two collections and from Prof. Barnes's notes to replace the incomplete published descriptions.

A stemless *herb*; root-fibres slender, puberulous, up to 16 cm. long (not including the tuber), mostly (all?) bearing a cylindric tuber up to 3 cm. long by 5 mm. diam., near its apex. (These tubers are not mentioned by Baker and Hooker though one plant on Jerdon's sheet exhibits 3 of them.). *Leaves* linear, up to 49 cm. long and 1 cm. wide (on the Jerdon sheet). *Flowers* few, 1-3 together in the axils below ground level, developing one at a time; pedicels slender, inarticulate, up to 5 cm. long in fruit. In addition 2 of Jerdon's plants bear what appear to be 2 or 3 slender scapes up to 11 cm. long, but devoid of flower or fruit, and one of these shows a short lateral branch (pedicel?). Barnes notes that the flowers are deep in the axils underground, so probably the pedicels lengthen after flowering to push the capsule above ground. *Tepals* very narrow, concave, white or colourless, with 5 very close nerves forming a median channel, margins narrowly membranous. *Stamens* in the groove of the tepals; filaments very slender, 4 mm. long; anthers yellow, 2-celled, 5 mm. long. *Style* 1.5 mm. long, stigma reddish. *Capsules* oblong, obtuse, slightly emarginate, 7-9 mm. long; seeds 4-5 in each cell, 2.5-3 mm. diam., black, shining, minutely muriculate.

Professor Barnes thinks that the flowers may be cleistogamous; this is very probable, but it is also possible that they may be fertilised by crawling insects.

***Dipcadi madrasicum*** *E. Barnes et C. E. C. Fischer*, sp. nov. [Liliaceae]; *D. montano* (Dalz.) Baker peraffinis, scapo foliisque longioribus, tepalis apice haud glandulosis, antheris filamentis multo brevioribus distinctum.

A scapigerous *herb*; bulb spherical to conical, up to 2.5 cm. diam., axis yellow, inner coats white, outer buff and membranous at first, later dark- or greyish-brown and loosely fitting; rootlets fibrous, white. *Leaves* few, radical, under dry conditions more or less terete, narrowly channelled above, 10-15 cm. long, 2-3 mm. diam., in moister localities linear, more or less flat with involute margins, tapering to a slender conical tip, narrowed to a tubular base, up to 33 cm. long and 5.5 cm. wide, subglossy, darkish-green upwards, brownish-red at ground level and white below ground. *Scape* erect, terete, smooth, glaucous green with a waxy lustre, usually longer than the leaves, up to 75 cm. long, 7-12-flowered, flowers pendent; bracts broadly ovate with a claw-like acuminate tip, base slightly auricled, lower margin erose or irregularly denticulate, greenish and membranous in bud, in flower brown and shrivelled, longer than the rather stout, curved, green, 3-5 mm. long pedicels. *Perianth* narrowly campanulate, 1-1.5 cm. long; the 3 outer tepals oblong,

attached for  $\frac{1}{3}$ – $\frac{1}{2}$  their length, pale-green, upper half reflexed, apex bluntly triangular with a thickened tip and a tuft of hairs within, eglandular; inner tepals slightly shorter, erect, yellowish-green with a thickened greenish rib, tip directed outwards with or without a tuft of hairs. *Stamens* attached to the upper part of the perianth-tube; filaments linear-ensiform, 4–5 mm. long; anthers linear, 2.7–3 mm. long, dorsifixed; pollen-grains ovoid, subacute at both ends, longitudinally grooved, 1 mm. long, 0.5 mm. wide. *Ovary* shortly stipitate, ellipsoid to obovate-ellipsoid, 4–5 mm. long; style stout, terete, 3–3.5 mm. long; stigma subglobose, obscurely 6-lobed. *Capsules* erect, straw-coloured, oblate, deeply 3-lobed, lobes spreading, vertically compressed, 7 mm. long, 1.2 cm. wide, margins irregularly thickened. *Seeds* numerous, irregularly discoid, thin, 5 mm. diam., black, subglossy, surfaces papillose, margins often thickened.

Chingleput District: Tambaram, 70 m., fls. Nov., *E. Barnes* 1801 (type in Kew Herb.), 2085. Also at Guduvancheri. Common in both localities in dry stream-beds and other sandy and marshy places in scrub jungle, flowering and fruiting Sept. to Nov. Tamil name *Katuveugaim*, a name which appears to be applied also to other bulbous plants; the bulb is eaten in times of scarcity.

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**XLI—CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA: XLIV.\*** FURTHER NOTES ON TROPICAL AMERICAN BIGNONIACEAE. N. Y. SANDWITH.

**Phryganocydia phellosperma** (Hemsl.) Sandwith, comb. nov.—*Macfadyena phellosperma* Hemsl. in Biol. Centr. Amer. Bot. ii. 492 (1882).

PANAMA CANAL ZONE. Swamp, Rio Grande, June 1861, *Sutton Hayes* 81 (type in Herb. Kew.). Near Balboa, behind mangrove swamp, June 1939, *A. H. G. Alston* 8830 (Herb. Mus. Brit., Herb. Kew.); flowers pale purple with darker spot on lip.

No reference was made to this very distinct plant by Standley in his *Flora of the Panama Canal Zone* (1928), and it has apparently awaited rediscovery until last year when Mr. Alston collected flowering material agreeing with the type and growing in a similar habitat. The peculiar character of the calyx, the simple tendril, flower-colour and other characters leave no doubt of the generic relationship of the species, and it is surprising that the necessary combination has not been made sooner. Apart from the very remarkable characters of the fruit—short and ovoid, with thick and corky, almost wingless seeds—which so little resembles the linear capsule and transversely oblong thin seeds with broad membranous wings of *P. corymbosa* (Vent.) Bur. ex K. Schum., *P. phellosperma* also differs from its ally in the more conspicuously and narrowly cuspidate apex of the leaflets which are more intricately

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\* Continued from K.B. 1939, 563.

reticulate beneath, and in the strongly pilose anterior side of the corolla within the tube above the insertion of the filaments. The calyx, moreover, appears to be more broadly and shortly horned.

The following note written by Sutton Hayes on the sheet bearing the fruit in the Kew Herbarium is of interest: "This is the fruit of no. 81, which was named *Spathodea corymbosa* Vent. but, if *Macfadyena corymbosa* of Grisebach's Flora is the same, my plant must be wrongly named, for the capsule is very different. My plant is found in swamps near Panama, and I never have seen it growing on high land, but my no. 222 named *Macfadyena corymbosa* Griseb. [this is correctly referred to *Phryganocydia corymbosa*] is always found on high land and never in swamps. The fruit of this plant [no. 81] is thick and fleshy like that of many other plants peculiar to swampy places." One may add the observation that parallel instances occur in *Bignoniaceae*, for instance in the genus *Tabebuia*, one species of which occurring on river-banks produces short capsules with corky more or less wingless seeds adapted for water-borne distribution.

Several perplexing collections of *Schlegelia* from Central and S. America have recently occupied the writer's attention. All of them resemble each other closely in general characters of the inflorescence, and are allied to the Brazilian *S. Ramizii*, a species of the section *Paratanaecium* with small white flowers. They differ from it, and most of them from each other, in small details which the writer prefers to treat as of varietal significance until there is far more evidence to the contrary. The following three varieties are therefore provisionally proposed:

***Schlegelia* (§ *Paratanaecium*) *Ramizii* Sandwith var. *macrandra* Sandwith, var. nov. ; a typo inflorescentiis glabrescentibus, corollae lobis majoribus ad 7.5 mm. longis, filamentis longioribus circiter 5 mm. longis glabris basi tantum breviter piloso-papillosis, antheris exsertis differt.**

AMAZONIAN PERU. Dept. Loreto ; Florida, Rio Putumayo, at mouth of Rio Zubinata, c. 180 m., in forest, fl. May-July 1931, *Klug* 2191 ; *ibid.*, fl. Oct.-Dec. 1931, *Klug* 2340 (typus). "Flowers white."

COSTA RICA. Vara Blanca de Sarapiquí, north slope of Central Cordillera, 1500-1750 m., fl. July-Sept. 1937, *Skutch* 3324. This collection has somewhat smaller corolla lobes and the filaments vary in length from 3-5 mm. "Flowers white."

***S. Ramizii* Sandwith var. *costaricensis* Sandwith, var. nov. ; a typo foliis majoribus ad 14 cm. latis, inflorescentiis dense furfuraceo-puberulis (haud pilosulis), filamentis longioribus 3 mm. longis basi albo-villosis ceterum glabris differt.**

COSTA RICA. Prov. San José ; El General, 700 m., fl. Feb. 1939, *Skutch* 4125 (typus). "Flowers white."

The following Colombian collections agree with this variety in characters of the leaves and stamens but differ in the pilosulous inflorescence :

COLOMBIA. State of Boyacá: Caviche region, 140 m. N. of Bogotá, in high forest, 1300 m., April 1933, *Lawrance* 756; El Humbo region, 130 m. N. of Bogotá, in high forest, 1300 m., May 1933, *Lawrance* 803. The corolla lobes of both these collections were noted as white, tinted at the base with purple or maroon.

*S. Ramizii* *Sandwith* var. *trichandra* *Sandwith*, var. nov.; a typo inflorescentiis dense furfuraceo-puberulis (ut in var. *costaricensi*), filamentis ut in typo brevissimis 1.2 mm. longis sed per totam longitudinem dense albo-villosis, staminodio etiam praesertim apicem versus albo-villoso differt.

BRITISH HONDURAS. Ann. 1906-7, *Peck* 666 (typus).

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## XLII.—STUDIES IN THE ERICALES: III.\* A NEW SPECIES OF GAULTHERIA FROM THE MALAY PENINSULA. H. K. AIRY-SHAW.

*Gaultheria malayana* *Airy-Shaw*, sp. nov.; ab affini *G. punctata* Bl. ramis subteretibus nec angulato-alatis, foliis crassioribus rigidioribus plerumque latioribus brevioribusque, bracteis sepalisque minoribus minus acuminatis facile distinguenda.—*G. fragrantissima* Wall. sec. Ridley in Journ. F.M.S. Mus. 6, 49 (1915) et Fl. Mal. Penins. 2, 212 (1923), non Wall.; cf. J. J. Smith in Koord. et Val. Bijdr. Booms. Java 13 (Meded. Dep. Landb. 18), 123 (1914), in obs.

*Frutex* vel *arbuscula*, statura ignota. *Rami* teretes vel obscurissime angulati, 2-3 mm. crassi, subrecti, glabri vel juniores minutissime papilloso-puberuli. *Folia* elliptica (rarius suboblunga) usque latissime suborbiculari-elliptica, 3.5-6.5 cm. longa, 1.5-4.7 cm. lata, apicem rami versus valde decrescentia, minima 1 cm. longa et 3 mm. lata, basi in maximis latissime subcuneata in mediocribus rotundata, apice rotundata vel obtusa, minute sed distinctissime (1 mm.) cuspidata, margine crebre subcrenato-serrulata, basin versus subintegra, crasse et rigide coriacea, utrinque glabra sed supra sparse subtus dense cicatricibus foveoliformibus brunneis setularum delapsarum conspicue punctata, folia juniora minima subtus setulis brevibus brunneis dense conspersa et setuloso-ciliata, siccitate supra brunneo-olivacea, subtus castanea; costa supra leviter impressa, subtus modice elevata, glabra; nervi laterales 5-7-jugi, immersi, subtus inconspicue prominuli, patuli, primum recti, deinde marginem versus arcuato-anastomosantes, reticulationibus laxis subtus valde obscuris; petioli usque 1 cm. longi, supra subplanii, sulcati, subtus teretes, glabri. *Racemi* axillares vel in paniculam terminalem fere aphyllam dispositi, 2.5-5.5 cm. longi, graciles,

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\* Continued from K.B. 1935, 156.

suberecti usque patuli, rarius patentes, 10–16-flori, minute puberuli. *Bracteae* minutae, ovatae, 1 usque vix 2 mm. longae, patentes, ciliolatae, ceterum glabrae, persistentes. *Pedicelli* graciles, patentes vel deflexi, 4–5 mm. longi, minute puberuli. *Bracteolae* binae, oppositae, imo apice pedicelli sitae, late ovatae, 1 mm. longae, ciliolatae, ceterum glabrae, persistentes. *Calyx* late cupularis, 4–5 mm. latus, 2–3 mm. longus, extra glaber, intus breviter pubescens, segmentis 5 ovatis 1–1.5 mm. longis acute cuspidatis minute ciliolatis. *Corolla* ovoideo-urceolata, circiter 4 mm. longa et 3 mm. lata, rosea et alba (teste Symington), lobis 5 late deltoideo-ovatis 1 mm. longis revolutis margine minute eroso-denticulatis. *Stamina* 10, fere 2.5 mm. longa: filamenta plana, obovata, 1 mm. longa, superne in connectivum abrupte attenuata, dense papillosa, longiuscule ciliolata; antherae oblongo-ovoideae, 1 mm. longae, thecis in caudas 2 graciles reflexas fere 1 mm. longas desinentibus. *Disci glandulae* staminibus alternantes, anguste triangulares, 0.5 mm. longae, ovario adpressae. *Ovarium* late depresso-ovoideum, 1.5 mm. longum, 2 mm. diametro, pubescens; stylus 1.8 mm. longus, inferne puberulus, superne glaber. *Capsula* in calyce nigro carnosio 4–5 mm. longo inclusa, 2–3 mm. longa, pubescens, pedicello usque 6–7 mm. elongato. *Semina* numerosa, irregulariter ovoidea, 0.5 mm. longa, reticulata, laete castanea.

PERAK. Gunong Korbu, 1800 m., Feb.–March 1913, *H. C. Robinson's Dyak Collectors* (typus, Herb. Kew.); *ibid.*, ridges above 1650 m., 22 July 1933, Symington 32117 (Kep.): “shrub or treelet; flowers pink and white;” C. H. Gunong Terbakar, summit, 12 Apr. 1934, Symington 36233 (Kep.); C. H. Gunong Batu Brinchang, 14 Apr. 1934, *Ja'amat & Yalip* 36505 (Kep.).

Dr. J. J. Smith (l.c.) regarded this plant as combining the inflorescence characters of *Gaultheria fragrantissima* Wall. and *G. punctata* Bl., since the racemes are both axillary (as in the former) and terminally paniced (as in the latter). But, while this is true so far as it goes, the subterete stems and thick rigidly coriaceous leaves of the Perak plant are very different from those of the Himalayan and of the Sumatran-Javanese species. The leaves are also shorter and broader than either, in their common forms, but I have not seen Miquel's *G. punctata* var.  $\beta$  ‘foliis multo minoribus ovatis vel ellipticis,’ based on a Korthals specimen from Mt. Papandayang, Java (Ann. Mus. Bot. Lugd. Bat. 1, 41: 1863). Provisionally, therefore, at least, I regard these as three distinct species.

I am indebted to Mr. C. F. Symington for the loan of material from the herbarium of the Forest Research Institute, Kepong, F.M.S. (indicated above by the abbreviation Kep.).



# XLIII—STUDIES IN THE ERICALES: IV.\*

CLASSIFICATION OF THE ASIATIC SPECIES OF GAULTHERIA. H. K. AIRY-SHAW.

The subdivision of the genus *Gaultheria* into natural groups has never been seriously undertaken. G. Don (Gen. Syst. 3, 839: 1834) seems to have been the first to deal with all the species known in his day; these numbered 29. He made only two divisions: "Flowers axillary, solitary. Peduncles or pedicels beset with some imbricated bracteas at the base;" and, "Racemes axillary and terminal at the tops of the branches. Pedicels bibracteate." He included *G. procumbens* L., the type species of the genus, in the first division, though actually it would require a separate division ("Flowers axillary, solitary. Pedicels bibracteate. [late.]).

A. P. de Candolle (Prodr. 7 (2), 592: 1869) enumerated 43 species, of which five were "non satis notae." The remaining 38 were arranged in three groups: "Pedicellis axillaribus 1-floris solitariis bibracteolatis, bracteolis immediatè sub flore sitis;" "Pedicellis axillaribus 1-floris solitariis bibracteolatis, bracteolis à flore remotis;" and, "Floribus racemosis, bracteis amplis sicco-membranaceis, bracteolis in medio aut basi pedicelli." The first of these groups, in which he placed all the known Asiatic species, was surprisingly heterogeneous. Although *G. procumbens* L. and *G. trichophylla* Royle were correctly included therein, with them were associated *G. Myrsinites* Hook. (i.e. *G. humifusa* [Grah.] Rydb.), *G. Nummulariae* DC. (i.e. *G. nummularioides* D. Don) and *G. repens* Bl., in none of which are the pedicels bibracteolate nor are the bracteoles immediately beneath the flower; and even more remarkable was the inclusion of the racemose-flowered *G. fragrantissima* Wall., *G. Leschenaultii* DC., *G. punctata* Bl. and *G. leucocarpa* Bl., in defiance of de Candolle's definition of the group.

C. B. Clarke's treatment of the Indian species (Fl. Brit. Ind. 3, 456: 1882) added little to the knowledge of the genus. *G. nummularioides* and *G. trichophylla* were separated from the remainder on account of their procumbent habit and solitary flowers, whilst *G. discolor* Nutt. and *G. semi-infera* (C. B. Cl.)† were placed (the latter provisionally) in the genus *Diplycosia*.

A tentative arrangement of the Malayan species was published by H. F. Copeland in the third of his series of papers on Philippine *Ericaceae* (Philipp. Journ. Sci. 47, 57-63: 1931)—incidentally a valuable and suggestive contribution to the study of the whole family. (Copeland's arrangement is adopted by van Steenis in Bull. Jard. Bot. Buitenz. sér. 3, 13, 204: 1934.). He recognizes three groups of species, designated as allies of *Gaultheria nummularioides*, of *G. fragrantissima*, and of *G. leucocarpa*, respectively. The second and third groups are undoubtedly natural; the first,

\* Continued from previous page.

† *Gaultheria semi-infera* (C. B. Cl.) Airy-Shaw, comb. nov.—*Diplycosia*? *semi-infera* C. B. Clarke in Hook. fil. Fl. Brit. Ind. 3, 459 (1882).

however, is unfortunately heterogeneous and involves some definitely erroneous statements. Thus, in the key to the species (*l.c.*, p. 58), *G. nummularioides* is stated to have "a definite pair of bracteoles immediately below the calyx": this is true of *G. trichophylla* Royle (included by Copeland in this group) and its allies, but *not* of *G. nummularioides*. In fact, none of the other species, mentioned by Copeland as "allies" of the latter, are such in reality.\* It is clear, therefore, that this group, characterized by "leaves generally under 2 cm. long" (*l.c.*, p. 57), is a purely artificial one.

The Asiatic species of *Gaultheria* can be arranged in natural groups by the use of the following characters:

- A. Leaves broadest below or above middle ( $\pm$ ovate or  $\pm$ obovate).
- B. Inflorescence perulate or eperulate at base.
- C. Flowers racemose or solitary.
- D. Pedicels bibracteolate at base, middle or apex, or bracteoles several, scattered.
- E. Corolla campanulate or urceolate.

By taking these characters in various combinations, it is possible to establish five major groups of species. It must be clearly stated that the groups here proposed are based solely upon the species of continental and insular Asia (together with four from North America whose affinities are evidently Asiatic). No attempt has been made to correlate with them the numerous Australasian and Central and South American species†, on which other workers both in this country and in America are already engaged. It is hoped, however, that the arrangement here sketched may suggest a basis upon which a satisfactory natural classification of the whole genus may ultimately be founded. The shape and nervation of the leaves, and the structure of the inflorescence, appear to give the best characters for groups, the position and number of the bracteoles being particularly important.

#### CONSPECTUS SECTIONUM ET SERIERUM.

Sect. i. **Brossaeopsis**, sect. nov. Pedicelli ima basi bibracteolati, bracteolis suboppositis; folia infra medium latiora (plus minus ovata); nervi praecipui pauci (utrinque 1-3), basales vel sub-basales (nervatio "melastomacea").

Series 1. DUMICOLAE *Airy-Shaw* in Hook. Ic. Plant. 33, sub t. 3207 (1933). Flores in racemos breves subcorymbosos basi perulatos dispositi; corolla campanulata, intus glabra; filamenta glabra; ovarium glabrum vel pilosum.—Typus: *G. dumicola* W. W. Sm.

Series 2. ATJEHENSES, ser. nov. Flores in racemos breves subcorymbosos basi pauciperulatos dispositi; corolla urceolata, intus puberula; filamenta longe pilosa; ovarium pilosum.—Species unica: *G. atjehensis* J. J. Sm.

\* *G. mundula* F. Muell., *G. novaguineënsis* J. J. Sm., *G. borneënsis* Stapf and *G. benguetensis* Copel. are "allies of *G. fragrantissima*."

† Compare, however, the remarks on p. 310, below, on Sect. *Brossaeopsis*.

Series 3. NUMMULARIOIDEAE, ser. nov. Flores solitarii ; bracteae et bracteolae similes, complures, stramineo-submembranaeae ; corolla campanulata usque urceolata, intus pilosa ; filamenta margine pilosa ; ovarium glabrum. Suffrutices prostrati, longe repentes.—Species unica : *G. nummularioides* D. Don.

Sect. ii. **Amblyandra**, sect. nov. Pedicelli pluribracteolati, bracteolis sparsis alternis ; folia infra medium latiora (plus minus ovata), penninervia usque subquintuplinervia ; flores solitarii (raro in pseudo-racemos terminales, ut videtur, dispositi) ; corolla campanulata, intus glabra ; filamenta glabra ; antherae exaristatae. Suffrutices parvi, saepe repentes.—Typus : *G. humifusa* (Grah.) Rydb.

Sect. iii. **Leucothoides**, sect. nov. Pedicelli prope basin, medium vel apicem bibracteolati, bracteolis alternis vel suboppositis ; folia plerumque supra medium latiora (plus minus obovata), penninervia ; flores in racemos basi perulatos plerumque adscendentes dispositi, interdum tetrameri ; corolla plerumque manifeste urceolata.—Typus : *G. fragrantissima* Wall.

Sect. iv. **Eugaultheria**, sect. nov. Pedicelli imo apice bibracteolati, bracteolis oppositis ; flores solitarii ; folia plerumque parva, penninervia.—Typus : *G. procumbens* L.

Series PROCUMBENTES, ser. nov. Flores pentameri ; corolla suburceolata, intus cum filamentis dense villosa ; ovarium omnino superum ; folia majuscula, usque 6 cm. longa et 1–3 cm. lata ; pedicelli usque 1 cm. longi. Suffrutex repens, ramis erectis apicem versus paucifoliatis.—Species unica : *G. procumbens* L.

Series TRICHOPHYLLAE, ser. nov. Flores pentameri ; corolla campanulata, raro urceolata, intus cum filamentis glabra ; ovarium omnino superum ; folia minuscula, usque 1.7 cm. longa et 0.8 cm. lata ; pedicelli 2–4 (raro 5–10) mm. longi. Suffrutices humiles, caespitiosi, ramulis erectis vel subprostratis dense foliatis.—Typus : *G. trichophylla* Royle.

Series HISPIDULAE, ser. nov. Flores tetrameri ; corolla brevissime campanulata, intus cum filamentis glabra ; ovarium spurie semi-inferum ; folia parva, brevissime ovata usque obovata ; pedicelli brevissimi. Suffrutices omnino prostrati, ramulis gracillimis longe repentibus distiche foliosis.—Typus : *G. hispidula* (L.) Muhlenb.

Sect. v. **Gymnobotrys**, sect. nov. Pedicelli imo apice bibracteolati, bracteolis oppositis ; flores racemosi ; racemi basi eperulati ; folia infra medium latiora (ovata usque lanceolata) ; flores in racemos axillares saepe deflexos vel in racemos vel paniculas terminales dispositi ; corolla plerumque campanulata.—Typus : *G. leucocarpa* Blume.

#### ARTIFICIAL KEY TO THE SECTIONS AND SERIES.

Flowers solitary ; dwarf undershrubs with mostly small leaves :

Bracteoles 2, opposite, immediately beneath the calyx.....

**Eugaultheria**

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pedicel, more or less enclosed by the bract. The short axis of the racemes and the proportionately rather long pedicels give the inflorescences a fasciculate appearance.

The species occur in two distinct geographical areas. The more northerly one includes practically the whole range of the Himalaya and the mountains of south-west China. *G. nummularioides* covers the whole of this region, and three isolated species occur in the eastern part. The more southerly area includes Java and Sumatra, where *G. nummularioides* again occurs, in the mountains, whilst two isolated species, clearly related to the other three, are known from the mountains of Sumatra.

These facts of distribution would seem to indicate an ancient type, in the past probably occurring over a wide area and represented by numerous species, but now limited to a few species on the verge of extinction in their few remaining localities.

A large group of American species of *Gaultheria*, including the well-known *G. Shallon* Pursh, are closely related to the Asiatic section now represented by these few relicts. This is especially true of the West Indian species, *G. cordifolia* (Sw.) Raeusch. (*Brossaea coccinea* L.; *Gaultheria coccinea* (L.) Urb. [1902], non H. B. K. [1819]) and *G. domingensis* Urb., in which the inflorescence is much contracted. The name *Brossaeopsis* has accordingly been adopted for the present group. The American species agree in leaf-shape and to a less extent in nervation, and the bracteoles are well below the middle of the pedicel. In the majority of the American group the bracts tend to be developed at the expense of the bracteoles, but in the two West Indies species they are more equal. The chaffy texture of these organs in *G. nummularioides* is very similar to that of many of the American species, except that in the latter they are usually conspicuously parallel-veined. Whereas, however, in Sect. *Brossaeopsis* the corolla is usually widely campanulate, in *Brossaea* it is definitely urceolate, showing in this respect an advance on the more primitive Asiatic group.

#### Series i. DUMICOLAE.

The four species of this series represent the most primitive type of *Gaultheria* surviving in the Old World. This is suggested both by the basal position of the bracteoles and also by the type of geographical distribution outlined above. The short, congested racemes, the campanulate corollas, the leaf-shape and peculiarly characteristic nervation and also (except in *G. dumicola*) the indumentum, call to mind certain species of *Diplycosia*, from which circumstance it might plausibly be inferred that that genus and the *Dumicolae* originated from a common, not far distant stock. The truly racemose inflorescence, however, the position of the bracteoles and the structure of the anthers exhibit a wide divergence from *Diplycosia*, a specialised and essentially uniform type, which must

have arisen very anciently, since no direct connecting links with *Gaultheria* now remain.

The inflorescence is comparable with that found in the American sections *Eulyonia* Rehd. and *Maria* Rehd., of the genus *Lyonia* Nutt. (*non* Ellis), and carried to its extreme state—the fascicle—in *Zenobia*, to the flowers of which those of *Gaultheria codonantha* Airy-Shaw (*vide infra*) bear a considerable resemblance. This resemblance is not confined to the superficial structure of the inflorescence, but is enhanced by close agreement in the morphology of the calyx, corolla, filaments, anthers and seeds, and perhaps indicates a closer relationship between these three genera than has hitherto been suspected.

#### CLAVIS SPECIERUM.

- Folia parva, usque 3·5 cm. longa ; ramuli graciles, usque 1 mm. crassi ; corolla circiter 5 mm. longa ; ovarium glabrum (Yunnan).....4. *notabilis*  
 Folia majora, 5–15 cm. longa ; ramuli robusti, 1–5 mm. crassi :  
 Rami et folia glaberrima ; corolla circiter 5 mm. longa ; stamina plerumque valde redacta, antheris saepe deficientibus ; ovarium pilosum (Yunnan).....3. *dumicola*  
 Rami et folia (saltem subtus) setosa vel hispido-pubescentia :  
 Folia plana, usque 15 cm. longa ; corolla circiter 15 mm. longa ; ovarium glabrum (Assam).....1. *codonantha*  
 Folia plana, usque 10 cm. longa ; corolla circiter 5 mm. longa ; ovarium pilosum (Burma super.)...3. *dumicola* var. *aspera*  
 Folia matura valde bullata, usque 7·5 cm. longa ; corolla circiter 5 mm. longa ; ovarium pilosum (Sumatra).....  
 2. *abbreviata*

1. **G. codonantha** Airy-Shaw in Hook. Ic. Plant. **33**, t. 3207 (1933); Journ. Roy. Hort. Soc. **59**, 305, Proc. p. cxxxi (1934); Bot. Mag. **159**, t. 9456 (1936).

*Gaultheria* sp., Gard. Chron. **94**, 424, 428 (fig. 182), 445 (1933).

*G. codonantha* may probably be regarded as the nearest known species to the prototype of the genus, for, apart from the contraction of the inflorescence-axis, it exhibits very little specialisation in any direction by comparison with its congeners. Whereas the majority of the species are adapted to life at considerable altitudes, *G. codonantha* occurs at an elevation of only 1,500 metres in Assam. The unrestrained development of all parts—leaves, flowers and general habit—suggests a relatively primitive species with little or no adaptation to special conditions.

2. **G. abbreviata** J. J. Sm. in Fedde, Rep. Spec. Nov. **35**, 292 (1934); van Steenis in Bull. Jard. Bot. Buitenz. ser. 3, **13**, 204 (1934).

Additional record :

SUMATRA. Resid. Padangsche Bovenlanden : Gunong Singgalan, 2100 m., 16 Jan. 1913, C. G. *Matthew* sine numero (Herb. Kew.).

The occurrence of a member of this otherwise East-Himalayan group as an outlier in the Malay archipelago is interesting and rather unexpected. In its robust habit and large bracteate inflorescences it is somewhat reminiscent of *Diplycosia sumatrensis* Merrill, also collected on Mt. Singgalan by Beccari (no. 328). The older leaves are remarkable for the bullate elevation of the tissue between the principal nerves. It may be noted that *G. abbreviata*, though the latest of this group to be described, was actually the first to be discovered, for Beccari's specimens (cited by J. J. Smith, *l.c.*; duplicate in Herb. Kew.) were obtained as long ago as 1878.

3. **G. dunicola** W. W. Sm. in Notes Roy. Bot. Gard. Edinb. **9**, 106 (1916).

*G. dunicola* was first collected by Forrest in May, 1912. The specimen, however, bore only old fruit. C. K. Schneider next obtained it in October, 1914 (*Schneider* 2561, Herb. Kew.). It was again gathered by Forrest on several occasions during later expeditions. All these collections came from the immediate neighbourhood of Tengyueh ( $25^{\circ}15'$  to  $25^{\circ}20'N.$ ) (the only known locality for *G. notabilis* also), at elevations of from 1800 to 2100 metres, where Forrest noted it as sometimes forming bushes 8-10 feet in height.

A greater contrast in allied species could scarcely be imagined than that obtaining between the diminutive, dingy flowers of *G. dunicola*, with its reduced androecium, and the large, handsome, white bells of *G. codonantha*, fully developed in all parts. It is evident that there are vast *lacunae* in this group, from consideration both of the morphology of its surviving representatives and also of their geographical distribution.

var. **petanoneuron** Airy-Shaw in Hook. Ic. Plant. **33**, t. 3206 (1933).

*Gaultheria dunicola* Auctt. Edin. in Notes Roy. Bot. Gard. Edinb. **17**, 158, 286, 360 (1930).

The variety *petanoneuron* was found by Forrest somewhat further north ( $25^{\circ}30'$  to  $26^{\circ}N.$ ) and at somewhat greater altitudes (2400-3000 metres) than the species, on the high divides on either side of the Salwin river.

var. **aspera** Airy-Shaw, var. nov., a typo foliis subtus brevissime et sparsiuscule subhispidopubescentibus distincta.

UPPER BURMA. Adung valley, 1800 m., 17 Feb. 1931, *F. Kingdon Ward* 9425 (Herb. Mus. Brit.): "A shrub, common in thickets. Leaves coriaceous, harsh. Berries with bluish-white bloom."

The discovery of this pubescent-leaved plant brings *G. dunicola* more into line with the remaining species of the series, all of which have more or less stiffly pubescent foliage.

4. **G. notabilis** Anth. in Notes Roy. Bot. Gard. Edinb. **18**, 18 (1933), descr. hic amplif.

*Suffrutex* a basi ramosus, 0.3-0.4 m. altus. *Caules* erecti vel arcuato-adscendentes, circiter 1 mm. crassi, teretes, subtiliter striati, longe (maxime juniores) ferrugineo-setosi, internodiis circiter 1-1.5 cm. longis. *Folia* plerumque ovata, rarius oblongo-vel elliptico-ovata usque latissime ovata, usque 3.5 cm. longa et 2 cm. lata, basi rotundata vel subtruncata (juniora leviter angustata), apice brevissime et abrupte callosa-apiculata vel -cuspidata, margine subintegra vel obscurissime serrulata, longe ciliata, supra glabra, olivacea, subtus (maxime secus nervos) sparse setulosa vel glabrescentia, pallide castanea, chartacea; nervi primarii laterales utrinque 2, saepe alterni, prope basin orti (sed e pari superiore alter saepe prope mediam costam ortus), late arcuati, laminam usque ad apicem percurrentes, venulis reticulatis, supra impressi, infra prominentes; petioli 1-3 mm. longi, setulosi. *Inflorescentiae* brevissime corymboso-racemosae, 3-8-florae, glaberrimae, rhachi 2-6 mm. longa. *Bracteae* ovatae, 1-2 mm. longae, cucullatae, dorso carinatae, acutae, fimbriato-ciliolatae; bracteolae bracteis similes, sed minores, nonnunquam paullo supra basin pedicelli ortae. *Pedicelli* usque 6 mm. longi, patuli. *Calyx* cupularis, 2-3 mm. longus et latus, explanatus 6-7 mm. latus, ultra medium fissus, segmentis triangularibus vel ovato-triangularibus acutis. *Corolla* campanulata, 5-6 mm. longa, 4-5 mm. lata, alba, lobis late deltoideis 2-3 mm. longis et latis apice obtusiusculis recurvis. *Staminum* filamenta subulata, ima basi attenuata, plana, 2 mm. longa, valde (maxime dorso) papillosa, margine basin versus parce longe ciliata; antherae lanceolato-ovoideae, circiter 1 mm. longae, apice deflexae, thecis breviter bicornibus. *Ovarium* depressoglobosum, 2 mm. diametro, 1.5 mm. altum, glabrum, basi disco obscuro brevissime 10-lobo cinctum. *Stylus* corollam subaequans, columnaris, teres, stigmatibus subcapitato lobato. *Capsula* non visa; calyce fructifero (teste *Forrest*) atro-purpureo.

The above description was prepared for publication before the appearance of Anthony's description of *G. notabilis* (*l.c. supra*); it is published here as being in some respects fuller than the latter.

This apparently very rare species, herbarium specimens of which bear a superficial resemblance to *Diplycosia pilosa* Blume, from Java, is at present known only from the vicinity of Tengyueh, Yunnan, growing "in dry thickets and amongst scrub, on dry stony slopes," at an altitude of 2400 metres (*Forrest* 26722). It provides a link, morphologically, with the series immediately following.

#### Series ATJEHENSES.

5. *G. atjehensis* J. J. Sm. in Fedde, Rep. Spec. Nov. 35, 293 (1934); van Steenis in Bull. Jard. Bot. Buitenz. sér. 3, 13, 205 (1934).

This species, at present known with certainty only from a single locality in Sumatra, forms an intermediate between the Series



*Dumicolae* and *Nummularioideae*. It is certainly allied to *G. nummularioides*, but not to *G. benguetensis* as suggested by van Steenis (l.c.). The urceolate corolla, paralleled also in certain forms of the next species, recalls that of the American species of *Brossaea*.

Series NUMMULARIOIDEAE.

It is possibly overrating the distinctness of *G. nummularioides* to separate it serially from the remaining species of the section; this course has, however, the advantage of affording parallel treatment to that provided by the segregation of the solitary-flowered section *Eugaultheria* (p. 318) from the racemose section *Leucothoides* (p. 316). *G. nummularioides* is interesting as representing a highly successful reduced type derived from the apparently unsuccessful *Dumicolae*. Whereas the latter seem at the present day to be dying out, their offshoot already occupies a wider area than any other Asiatic species of the genus, and shows signs of eventually resolving itself into a multiplicity of forms or even species in much the same way as the similarly reduced and successful *Trichophyllae*.

6. *G. nummularioides* D. Don, Prodr. Fl. Nep. 150 (1825); Royle, Ill. Bot. Himal. t. 63, fig. 2 a-e (Aug. 1835) et p. 260 (Dec. 1835); C. B. Clarke in Hook. fil. Fl. Brit. Ind. 3, 457 (1882); Franch. in Nouv. Arch. Mus. (Paris), sér. 2, 10, 44 (1887); reimpr.: Pl. David. 2, 82 (1888); Koord. Exk.-fl. Java, 3, 10 (1912); J. J. Sm. apud Koord. et Valetton, Bijdr. Kenn. Boomsoort. v. Java, 13, 114 (1914), descr. opt.

*Gaultheria repens* Bl. Bijdr. Fl. Nederl. Ind. 857 (1826); DC. Prodr. 7 (2), 593 (1839).

*Gaultheria nummulariae* DC. Prodr. 7 (2), 592 (1839).

*Gaultheria* sp., Griffith, Ic. Pl. As. 4, t. 518, fig. 2 (1854).

*Pernettya repens* (Bl.) Zoll. et Mor. in Mor. Syst. Verz. v. Zoll. a. Java gesamm. Pfl. 42 (1846), et in Zoll. Syst. Verz. Ind. Archip. gesamm. Pfl. 2, 138 (1854).

*Gaultheria trichophylla* Hassk. Retzia [ed. 1], 1, 108-110 (1855); ed. nov. (Hort. Bog. Descr.), 1, 148-150 (1858), descr. opt.; non Royle.

*Gaultheria nummularia* Hassk. ll. cc. (1855 et 1858), pro synon. dub. *G. trichophyllae* Hassk. non Royle.

*Brossea nummularioides* [sic] O. Kuntze, Rev. Gen. Pl. 2, 388 (1891).

var. *elliptica* Rehd. et Wils. in Sargent, Pl. Wils. 1, 555 (1913).

The species exhibits a considerable amount of variation throughout its range, in leaf-size (and, to a less extent, in leaf-shape), in indumentum and in size and shape of corolla, but it has not been found possible to recognize any form as distinct except the variety *elliptica*. In Sumatra and Java the leaves tend to be of a uniformly small type, and the corolla is apparently urceolate or

at least cylindric ; this form can, however, be almost exactly matched by specimens from the Himalaya, which are in turn connected by numerous intermediates with large-leaved, campanulate-flowered forms from western China. Otto Kuntze's proposed varieties *normalis* and *glauca* appear quite untenable.

## Section ii. *Amblyandra*.

A small isolated group of three closely allied species from the temperate regions on either side of the North Pacific, showing a simplified type of anther structure. The solitary flowers probably represent the terminal flower of a raceme, the numerous apparent bracteoles being in reality the bracts of the suppressed lateral flowers. As already noted, *G. nummularioides* exhibits the same phenomenon and may perhaps be regarded as a connecting link between the sections *Brossaeopsis* and *Amblyandra*.

### CLAVIS SPECIERUM.

Pedunculi valde elongati, usque 3 cm. longi, glanduloso-pilosi, ex axillis foliorum summorum saepe valde redactorum orti ; bractaeae numerosae, dissitae (Japonia).....1. *adenothrix*

Pedunculi breves, corolla breviores usque vix duplo longiores, glabri vel apicem versus pilosi ; bractaeae paucae (circiter 4), plus minus confertae (America bor.-occ.) :

Corolla calyce hirsuto plus duplo longior ; folia acuta...2. *ovatifolia*

Corolla calyce glabro vix longior ; folia subobtusata...3. *humifusa*

1. *G. adenothrix* (Miq.) Maxim. in Mém. Biol. 8, 610 (1872) et in Bull. Imp. Acad. Sci. St. Pétersb. 18, 44 (1873) ; Franch. et Sav. Enum. Pl. Jap. 1, 283 (1875) ; Miyoshi et Makino, Pocket Atl. Alp. Pl. Jap. 1, 10, t.v. fig. 30 (1906) ; Rehd. Man. Cult. Tr. & Shr. 717 (1927).

*Andromeda* (§*Lyonia*) *adenothrix* Miq. in Ann. Mus. Bot. Lugd.-Bat. 1, 31 (1863).

*Brossea adenothrix* (Miq.) O. Kuntze, Rev. Gen. Pl. 2, 388 (1891).

*Diplycosia adenothrix* (Miq.) Nakai in Bot. Mag. Tok. 35, 135 (1921) ; Nak. et Koidz. Trees and Shrubs Jap. Prop. ed. 1, 1, 164 (1922) ; ed. 2, 1, 225 (1927) ; Makino et Nemoto, Nipp.-Shokub.-Sôran (Fl. Jap.), ed. 1, 865 (1931) ; Terasaki, Nipp.-Shokub.-Zufu (Jap. Bot. Ill. Alb.) 744 (1933).

Nakai's transference of this plant to *Diplycosia*, made presumably on the basis of its exappendiculate anthers, shows a failure to grasp the essential characters of that genus, which are the fascicled flowers, pedicels with two connate apical bracteoles, and anther-thecae produced into unappendaged tubules ; the genus is, moreover, a definitely tropical and subtropical one, not extending north of the Philippines. *Gaultheria adenothrix* shows none of these features.

The relationship of this species to the next two has already been indicated by Rehder (*l.c.*, 1927).

2. *G. ovatifolia* A. Gray in Proc. Amer. Acad. 19, 85 (1883); S. Brown, Alp. Fl. Can. Rocky Mount. 213, t. 58, fig. *b* (1907); Small in North Amer. Fl. 29 (1), 75 (1914); Armstr. et Thornb. Field Book West. Wild Flow. 342, fig. ad 343 (1915); Rydb. Fl. Rocky Mount. 642 (1917); Bean, Trees and Shrubs, 3, 174 (1933).

*G. Myrsinites* forma, A. Gray, Synopt. Fl. North Amer. ed. 2, 2 (1), 26 (1886).

Intermediate in most of its characters between the two other species of the group. The indumentum is very similar to that of *G. adenothrix*.

3. *G. humifusa* (Grah.) Rydb. in Mem. New York Bot. Gard. 1, 300 (1900); F. E. et E. S. Clements, Rocky Mount. Flow. 86, t. 15, fig. 6 (1914); Small in North Amer. Fl. 29 (1), 75 (1914); Rydb. Fl. Rocky Mount. 642 (1917); Jepson, Man. Flow. Pl. Calif. 744 (1925); Rehd. Man. Cult. Tr. & Shr. 716 (1927).

*Vaccinium humifusum* Grah. in Edinb. New Philos. Journ. 11, 193 (1831).

*Gaultheria Myrsinites* Hook. Fl. Bor.-Amer. 2, 35, t. 129 (1834); DC. Prodr. 7 (2), 592 (1839).

*Brossea myrsinites* (Hook.) O. Kuntze, Rev. Gen. Pl. 2, 388 (1891).

Occasionally develops a sparse straggling indumentum on the stems, similar to that of *G. ovatifolia*, and is also sometimes very minutely whitish-puberulous.

### Section iii. *Leucothoïdes*.

This section, characterized by the subopposite or alternate bracteoles at about the middle of the pedicel (more rarely near the base or close to the calyx), and by usually obovate to oblanceolate leaves, contains the largest number of Asiatic species and is certainly capable of further subdivision. It is hoped to attempt this on a future occasion. The group has its centre of distribution in the eastern Himalaya and south-western China, with extensions into southern India and Ceylon, the Malay Peninsula, Sumatra, Java, Celebes and New Guinea.

The group appears to be a natural one, but the species are recognizable more by a combination of characters than by any one infallible criterion. Thus the corolla is almost always decidedly urceolate, but a conspicuous exception is *G. Griffithiana* Wight, in which the corolla is shortly campanulate with rather large triangular lobes; the species is, however, clearly related to other more typical members of the group. The flower is normally

pentamerous, but tetramerous flowers are frequent in *G. tetramera* W. W. Sm. The leaves are usually broadest above the middle, with a more or less cuneate base, but in *G. Hookeri* C. B. Cl. (*G. Veitchiana* Craib) and a few others the leaves are often more ovate in outline, with a distinctly rounded, truncate or even subcordate base. In *G. semi-infera* (C. B. Cl.) Airy-Shaw, the ovary tends to become inferior. The anthers of *G. discolor* Nutt. are almost exappendiculate. A wide range is found in the position of the bracteoles, which may occur, in different species, anywhere from the base to the apex of the pedicel; in *G. Forrestii* Diels, and in all the Malayan species, they are apical.

Most workers on this group have probably been impressed by the remarkable similarity in general outward morphology between *Gaultheria Griffithiana* and *Leucothoë Griffithiana* C. B. Clarke. There seems little doubt that this is no mere coincidence. *G. Griffithiana*, though unquestionably a species of *Gaultheria*, provides an almost perfect link between that genus and *Leucothoë* Sect. *Euleucothoë* and is certainly one of the more primitive members of Sect. *Leucothoëides*. It will be recalled that the principal differences between *Leucothoë* and *Gaultheria* lie in the staminal structure, the fruiting calyx and the seeds. The latter genus may be regarded as an advanced type of the former, adapted for seed-dispersal by the agency of birds. *Leucothoë*, doubtless relying mainly on the wind to scatter its light, winged seeds, is evidently, judging by its present geographical distribution, a less successful type than *Gaultheria*, whose fleshy and often brightly coloured "fruits" must be a strong attraction to birds. The smooth, hard, unwinged testa of *Gaultheria* seeds may well be a concomitant adaptation, enabling them to withstand digestion by the birds which feed upon them and so to pass through unaffected. (Cf. van Steenis in Bull. Jard. Bot. Buitenz. sér. 3, 13, 405: 1935).

The following described species are referable to this section: *G. fragrantissima* Wall., *G. Griffithiana* Wight, *G. Forrestii* Diels, *G. caudata* Stapf, *G. Wardii* Marq. et Airy-Shaw, *G. Hookeri* C. B. Cl. (*G. Veitchiana* Craib), *G. discolor* Nutt., *G. semi-infera* (C. B. Cl.) Airy-Shaw and *G. tetramera* W. W. Sm. (all from the Himalaya and South-West China); *G. Leschenaultii* DC. (South India) and *G. rudis* Stapf (Ceylon). Several undescribed species remain to be segregated from Chinese and Indian material. In the Malayan region there is a closely allied group in which the flowers are borne in leafless terminal panicles or in leafy racemes, and the bracteoles are consistently apical: this includes *G. malayana* Airy-Shaw (Perak), *G. punctata* Bl. (Sumatra & Java), *G. celebica* J. J. Sm. (Celebes), *G. novaguineënsis* J. J. Sm., *G. Pullei* J. J. Sm., *G. calyculata* Wernh., and *G. mundula* F. Muell. (New Guinea). In addition to the species listed, the following form a small related group characterized by the more or less sympodial relation of the inflorescence to the main vegetative axis: *G. pyrolifolia* Hook. f.

et Thoms. (E. Himalaya); *G. pyrolloides*\* Miq. (Japan); *G. cuneata* (Rehd. et Wils.) Bean and *G. prostrata* W. W. Sm. (S.W. China); *G. Itoana* Hay. (Formosa); *G. benguetensis* Copel. (Philippines); *G. borneensis* Stapf (Borneo).

#### Section iv. *Eugaultheria*.

The type species of the genus *Gaultheria* is the widespread North American species, *G. procumbens* L., characterized by solitary flowers bibracteolate at the apex of the pedicel. Those species which agree with *G. procumbens* in these essentials are therefore here assembled to form what must be considered the type section of the genus. *Eugaultheria*, however, containing, as it does, the most reduced species known in the genus, cannot be considered "typical" of *Gaultheria*. These reduced species nevertheless represent a highly successful type—successful, that is, under present conditions. The majority are microphyllous plants adapted to life in an alpine environment at considerable altitudes, their headquarters being in the high mountains of the Sino-Himalayan ranges, where they have split up into a large number of closely allied forms, a process which may indeed still be taking place. *G. procumbens*, however, representing a distinct series within the section, is a broad-leaved type, suited to more lowland conditions, and as such occupies a large area in the woodlands of temperate North America, where its remarkable uniformity practically throughout its range contrasts strongly with the protean variety of the Sino-Himalayan group. The discontinuous distribution of the small series *Hispidulae* is interesting, for in this case it cannot well be argued (as was done, above, for the series *Dumicolae*) that a primitive and unsuccessful type is concerned. The two species of this series, *G. hispidula* (L.) Muhlenb. and *G. suborbicularis* W. W. Sm., represent the last word in reduction within the genus. The former, occurring in Japan and temperate North America, frequents (at least in the latter country) woods and sphagnum bogs—habitats similar to those favoured by a plant of very similar habit, *Oxycoccus Oxycoccus* (L.) MacM.—, whilst *G. suborbicularis* is one of the high alpine plants of western Yunnan.

The opposite apical position of the bracteoles is a character towards the acquisition of which evolution in *Gaultheria* has not

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\* This name was ascribed by Miquel (Ann. Mus. Bot. Lugd.-Bat. 1, 30 : 1863) to "Hook. fil. et Th. herb. Ind. or." There is, however, no evidence that this name was ever used or even proposed by the latter authors. The type sheet from Herb. Hook., seen by Miquel, is written up "G. pyrolaeifolia H. f. et T." in Hooker's handwriting. Miquel erroneously identified the Japanese plant with the Himalayan species which he had seen in Hooker's herbarium and which was later described by C. B. Clarke (Fl. Brit. Ind. 3, 457 : 1882) as "*G. pyrolaeifolia* Hook. f. ms." The epithet *pyrolloides*, therefore, though evidently a mistake for *pyrolifolia*, should be credited to Miquel and, since it was accompanied by a description, can legitimately be used for the Japanese species, Takeda's proposed alteration to *Miqueliana* (Bot. Mag. Tok. 32, 195 : 1918) being consequently superfluous.

infrequently tended. Compare also *Diplycosia* and *Pernettyopsis*, in which they constantly occupy this position, and the related *Theaceae-Ternstroemiöideae* (*Ternstroemia*, *Annesleya*, etc.), in which their position and form are very similar, though here they are often deciduous (cf. Hook. Ic. Pl. 34, t. 3342, p. 3: 1937). Apical bracteoles appear to represent a kind of evolutionary climax.

A parallel may perhaps be traced in the form of the corolla. As sympetaly is commonly derived from polypetaly, so, surely, "stenostomy" may be regarded as a development from "eurystomy," or (lest this be Greek to some) an "urceolate" or pinched-at-the-mouth corolla as derived from a "campanulate" or wide-mouthed type, an adaptation for restricting the type of insect visitor that can effect cross-fertilisation. As mentioned already (p. 316), the section *Leucothoïdes* is almost uniformly characterized by the urceolate type; but *Gaultheria Griffithiana* Wight has lagged behind in this respect and has retained the earlier campanulate type, appearing somewhat anomalous among its near relatives. In *Eugaultheria*, on the other hand, although bracteolar evolution has apparently proceeded as far as it can (or at any rate probably will), the corolla generally conforms to the more primitive campanulate type; in *G. procumbens*, however, the corolla is subcylindric with a leaning towards the urceolate form, while *G. cardiosepalala* Hand.-Mazz. (series *Trichophyllae*) has a definitely urceolate corolla. The urceolate type of corolla may be regarded as another evolutionary climax in the *Ericaceae*.

#### Series 1. PROCUMBENTES.

1. **G. procumbens** L. Sp. Pl. ed. 1, 395 (1753); G. Don, Gen. Syst. 3, 839 (1834); DC. Prodr. 7 (2), 592 (1839); Britton et Brown, Ill. Fl. North. States & Can. 2, 693 (1913); Small in North Amer. Fl. 29 (1), 75 (1914); Alexander in Addisonia, 12, 53, t. 411 (1927).

*G. humilis* Salisb. Prodr. Stirp. Hort. Chap. Allert. 289 (1796).

*G. repens* Raf. Med. Fl. 1, 202, t. 40 (1828), non Blume.

*Brossea procumbens* (L.) O. Kuntze, Rev. Gen. Pl. 2, 388 (1891).

forma **suborbiculata** Fernald in Rhodora, 22, 155 (1920); Deane in Rhodora, 24, 153 (1922).

forma **elongata** Svenson in Rhodora, 25, 184 (1923).

forma **accrescens** Fernald et Hodgdon in Rhodora, 36, 129, t. 283 (1934).

The type species of the genus *Gaultheria*, *G. procumbens* is morphologically one of the most isolated species known. Possibly its nearest living relative is *G. pyrolloïdes* Miq., from Japan, the shape, texture and venation of whose leaves are not very dissimilar, though in characters of inflorescence the two species differ widely. If this be the case, the section *Eugaultheria* must be regarded as at least diphyletic, since it is difficult not to trace the origin of the

*Trichophyllae* to species, allied to *G. pyroloïdes*, such as *G. cuneata* (Rehd. et Wils.) Bean and *G. prostrata* W. W. Sm., or their ancestors. This at least seems more natural than to imagine *G. procumbens* as the ancestral type of the *Trichophyllae*, not only on morphological but on phytogeographical grounds.

Reduction in leaf-dimensions and shortening of internodes and of pedicels have been the general accompaniments of the solitary flowers of *Eugaultheria*, but *G. procumbens* provides the exception to this. No other species of the section has such large leaves and only *G. dolichopoda* (described below) equally long pedicels.

While, therefore, the association of *G. procumbens* with the other members of the section may mean the juxtaposition of at any rate two independent lines of descent within the genus, it is perhaps the best scheme that can be devised, having regard to the exigencies of a linear arrangement.

#### Series 2. TRICOPHYLLAE.

The very closely allied species of this series constitute as it were the nucleus of the section *Eugaultheria*. Our knowledge of these critical forms is certainly far from complete, since every fresh collection from Upper Burma and Western Yunnan brings to light something new. The present treatment must therefore be regarded as at best provisional and probably unsatisfactory: full descriptions of the new forms here given the rank of species have not been supplied, since short diagnoses seem for the present to serve equally well. Further material may indicate the necessity for raising or lowering the rank of several of these forms.

*G. dolichopoda* (described below) may be recognised by its long pedicels; *G. cardiosepala* Hand-Mazz. has a conspicuously urceolate corolla; *G. trichophylla* Royle has (normally) only two horns per anther; and *G. nivea* (Anth.) Airy-Shaw has minutely puberulous stems. The key below may help to determine the remaining species, but it is only tentative; comparison with authentic specimens is essential in this critical group.

A possible derivation of the *Trichophyllae* would seem to be from Sect. *Leucothoïdes*, via the sympodial group mentioned above (p. 317-8), particularly species such as *G. cuneata* (Rehd. et Wils.) Bean and *G. prostrata* W. W. Sm. It is not, of course, suggested that these actually are their ancestors, but they are probably phylogenetically connected.

I am much indebted to the Regius Keeper, Royal Botanic Garden, Edinburgh, and to the Keeper, Dept. of Botany, British Museum, for the loan of material of this group.

#### CLAVIS SPECIERUM.

Pedicelli 5-9 mm. longi; folia oblongo-oblancoolata, usque 15 mm. longa, 2-4 mm. lata, apicem versus regulariter et remotiuscule serrulata, rigide coriacea, glaberrima, costa subtus albida valida prominente; planta satis robusta, usque 25 cm. alta  
2. *dolichopoda*

Pedicelli usque 3 (raro vix 4) mm. longi; plantae graciliores, humiliores:

Ramuli dense minutissime albido-tomentelli, setulis ferrugineis sparsis; folia oblonga, 5-8 mm. longa et 2-3 mm. lata, eciliata; fructus albus.....8. *nivea*

Ramuli praeter setulas ferrugineas sparsas vel densas glabri, raro sparse minute albo-puberuli; fructus caeruleus vel roseus vel albus:

Folia matura longe setuloso-ciliata, elliptico-oblonga, rarius obovata vel ovata; ramuli patenti-setulosi; disci glandulae parvae, deltoideo-subulatae; thecae plerumque uniaristatae

5. *trichophylla*

Folia matura eciliata; ramuli breviter adpresso-setulosi vel minute verruculosi vel subnudi; disci glandulae majores, late depresso-ovatae:

Folia linearia usque oblanceolato-linearia, 1.5-2.5 mm. lata:

Folia 5-9 mm. longa; sepala lanceolata; corolla breviter campanulata .....3. *thymifolia*

Folia majora, 7-14 mm. longa; sepala ovata; corolla oblongo-urceolata .....4. *cardiosepala*

Folia elliptico-oblonga usque obovata, 3-8 mm. lata:

Folia plus minus chartaceo-coriacea, obovata, basi cuneata, apice rotundata, subtus pallide et saepe laete viridia, usque 15 mm. longa et 8 mm. lata, nervis subtus prominulis.....6. *hypochlora*

Folia rigide et crassius coriacea, elliptico-oblonga usque obovata, multo minus conspicue discoloria, usque 17 mm. longa et 5 mm. lata, plerumque acuta, nervis obscuris .....7. *sinensis*

2. ***G. dolichopoda*** *Airy-Shaw*, sp. nov., *G. thymifoliae* Stapf et *G. cardiosepalae* Hand.-Mazz. affinis sed omnibus partibus major, foliis conspicue serrulato-dentatis obtusioribus crassioribus, costa validiore, pedicello elongato usque 1.9 cm. longo distinctissima.

*Gaultheria* sp.n.? Marquand [et Airy-Shaw] in Journ. Linn. Soc. Bot. 48, 199 (1929).

S.E. TIBET. Tsangpo Gorge, near Sechen La, 3000-3300 m., along the open ridge in thick *Abies-Rhododendron* forest, 1 Dec. 1924, *Kingdon Ward* 6331 (typus, Herb. Kew.): "Undershrub of 6-9 in. growing in clumps. Berries pendent, bright blue." Burmese frontier, lat. 28°25'N., long. 97°55'E., 3000-3300 m., 21 Oct. 1931, *Kingdon Ward* 10,130 (Herb. Mus. Brit.): "A gregarious almost prostrate plant, plastering the smooth steep rock faces, or growing in moss under scrub *Rhododendron* and *Arundinaria*. Flowering shoots ascending erect, the Prussian blue berries pendent on half-inch pedicels. Grows in the precipitous gullies which, facing north, were choked with snow till July."



Clearly allied to the next two species, but the elongate pedicels are paralleled only by those of *G. procumbens* L. Unfortunately the flowers are unknown.

3. *G. thymifolia* Stapf MS., sp. nov., *G. cardiosepalae* Hand.-Mazz. arcte affinis, foliis minoribus 5–9 mm. longis, sepalis magis lanceolatis obtusioribus, imprimis corolla breviter aperte campanulata interdum purpureo-rubra, calyce fructifero laete roseo-rubro distincta.

UPPER BURMA. Chawchi Pass, among cool mossy granite boulders in the high-alpine zone, nearing the top of the pass, 3540 m., 3 July 1920, *Farrer* 1667 (Herb. Edin.): "Flowers white." On humus-covered boulders and as an undershrub in dwarf scrub in side valleys, 26°24'N., 98°48'E., 3300 m., June 1925, *Forrest* 26,867 (typus, Herb. Kew.): "Matted dwarf shrub of 2–4 inches. Flowers white." Advance Base, Seingku Wang, 3000–3300 m., on precipitous earth and stone slopes in gullies which face south and are now clear of snow, 5 June 1926, *Kingdon Ward* 6849 (Herb. Kew.): "Creeping plant forming mats. Flowers maroon." "Berries bright rosy red (28 Sept. 1926)." (Also in ASSAM; vide *Kingdon Ward* 8605, sub *G. sinensis* Anth., infra, p. 325.)

Reddish flowers and fruit are noted by collectors as sometimes occurring also in *G. trichophylla* Royle.

4. *G. cardiosepala* Hand.-Mazz. in Anz. Akad. Wiss. Wien, Math.-Nat. Kl. 1923, 60, 185 (1924); reimpr: Pl. Nov. Sin., Forts. 23, 6 (1924); Naturb. Südw.-China 129 (1927); Symb. Sin. 7, 792 (1936).

In addition to the two specimens collected and cited by Handel-Mazzetti, the following appear referable to this species:—

YUNNAN. Humus-covered ledges of cliffs on the eastern flank of the Tali range, 25°40'N., 3300–3600 m., Aug.–Sept. 1906, *Forrest* 4188 (Herb. Edin.): "Shrub of 3–6 inches. Flowers white." Dry ledges of cliffs on the eastern flank of the Tali range, 25°40'N., 3300–3600 m., July 1906, *Forrest* 4190A (Herb. Edin.): "Tufted shrub of 3–6 inches. Fruit pale purple. Flowers white?" Dry situations in pine forests on the Shweli-Salwin divide, 24°40'N., 2100–2400 m., March 1906, *Forrest* 5003 (Herb. Edin.): "Undershrub of 10–12 inches. Flowers white, tinged rose." Moist rocky banks on the margins of scrub on the eastern flank of the Tali range, 25°40'N., 3000–3600 m., July 1910, *Forrest* 6784: "Procumbent shrub of 6–12 inches. Flowers white, fruits blue." Open stony pasture and on humus-covered boulders in *Rhododendron* forest on the western flank of the Shweli-Salwin divide, 25°20'N., 3000–3300 m., Aug. 1912, *Forrest* 8931: "Dwarf shrub of 3–6 inches. In fruit, fruit pinkish white." On rocks and stony pasture, Shweli-Salwin divide, 25°20'N., 3000 m., Sept. 1913, *Forrest* 12,021 (Herb. Edin.). On banks amongst scrub and on alpine moorland on the Chien-chuan-Mekong divide, 26°30'N., 99°40'E., 3600–3900 m., Sept. 1922, *Forrest* 22,333: "Shrub of 4–7 inches. In fruit, fruits

white." Tali range, Sept. 1929, *Forrest* 28,077 (Herb. Edin.). Sine loc., *Forrest* 30,879 (Herb. Edin.). Mountains of the Yangpi River drainage basin, Aug. 1922, *Rock* 6272 (Herb. Edin.). Lotueshan, mountains of Labako, west of the Yangtze bend at Shiku, 3600 m., June 1923, *Rock* 9517 (Herb. Edin.): "Height 10 inches; flowers white."

UPPER BURMA. On open granite rocky hillsides facing south, Hpimaw, 3000-3300 m., 20 June 1914, *Kingdon Ward* 1691 (Herb. Edin.): "Dwarf undershrub forming carpets and patches. Flowers white." Like heather on the open slopes of the lower high-alpine zone, Hpimaw Hill, 3240 m., 10 May 1919, *Farrer* 895 (Herb. Edin.): "Foliage bronzed, flowers pinky white. Fruit snow white." N'Maikha-Salwin divide, 26°30'N., 3300 m., June 1931, *Forrest* 29,668 (Herb. Edin.). Hpimaw Pass, above 3300 m., 8 June 1929, *Sukoe* 10,080: "Herb; fl. pinkish white; stem hard, grows in patch."

The shape of the corolla immediately distinguishes this species from its allies. The fruiting calyx is evidently even more variable in colour than that of *G. trichophylla*. The leaves of *Rock* 9517 reach a length of 2 cm.

5. *G. trichophylla* Royle, Ill. Pl. Himal. t. 63, fig. 3, a-e (Aug. 1835)\* et p. 260 (Dec. 1835); DC. Prodr. 7 (2), 592 (1839); C. B. Clarke in Hook. fil. Fl. Brit. Ind. 3, 457 (1882).

*Brossea trichophylla* (Royle) O. Kuntze, Rev. Gen. Pl. 2, 388 (1891).

Apart from the two Szechuan specimens cited below under var. *tetracme*, the only Chinese specimen seen that can be certainly referred to this species is the following:

W. YUNNAN. Moist, open, rocky situations on the eastern flank of the Tali Range, 25°40'N., 3600 m., Aug.-Sept. 1906, *Forrest* 4190 (Herb. Kew.; mixed with 4190A, *G. cardiosepala* Hand.-Mazz., in Herb. Edin.): "Shrub of 3-6 inches. Flowers white; fruit large, bright indigo blue, edible."

var. *tetracme* *Airy-Shaw*, var. nov. thecis biaristatis aristas longioribus fere 1 mm. longis, foliis potius ovatis vel ovato-oblongis quam oblongo-ellipticis.

*G. trichophylla* Royle sec Hook. fil. in Bot. Mag. 125, sub t. 7635 (1899), quoad plantam sinensem; Dunn in Journ. Linn. Soc. Bot. 39, 451 (1911); Rehd. et Wils. in Sargent, Pl. Wils. 1, 556 (1913); non Royle.

SZCHUAN. Near Tachienlu, 2700-4100 m., *Pratt* 833 (Herb. Kew.); sine loc. exact, 4200 m., July 1904, *Wilson* (Exped. Veitch.) 3915 (typus, Herb. Kew.): "Fls. white, fruit blue."

S. TIBET. Samchung La (Kharta), in stony soil, facing north, 4650 m., 20 June 1922, *Norton* (Exped. Mt. Everest) 172: "Flowers pink."

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\* Vide Sprague in Bull. Misc. Inf. Kew, 1933, 383, 386.

Dr. O. Stapf's manuscript notes show that he—at any rate provisionally—regarded this form with 4-horned anthers as specifically distinct. It does not, however, seem possible to correlate with this character any other really tangible differences (the leaf character mentioned being very slight), and I am therefore unwilling to accord these specimens more than varietal rank.

var. **obovata** *Airy-Shaw*, var. nov. foliis majoribus usque 1.3 cm. longis et 0.65 cm. latis obovatis rarius oblongo-obovatis.

UPPER BURMA. Seinghku Wang, 28°8'N., 97°24'E., on mossy boulders in the open valley, intertwined with dwarf *Salix* and forming a mat, 3300 m., 17 June 1926, *Kingdon Ward* 6944 (Herb. Kew.): "Corolla white, stigma crimson, anthers yellow, calyx tinged purple."

A specimen showing an approach to this variety in the size of the leaves, but retaining the oblong-elliptic shape typical of the species, is *Watt* 5219, collected May 1881 in SIKKIM at 4500 m. (Herb. Kew.).

6. **G. hypochlora** *Airy-Shaw*, sp. nov., *G. sinensi* Anth. affinis, foliis tenuiter chartaceo-coriaceis obovatis basi cuneatis apice rotundatis usque 8 mm. latis subtus (siccitate) pallide et saepe laete viridibus, nervis subtus prominulis, corolla ut videtur latius campanulata, bene distincta.

*G. trichophylla* Royle, vel aff., Auctt. Edin. in Notes Roy. Bot. Gard. Edinb. 17, 92 (1929).

*G. sinensis* Anth. in Notes Roy. Bot. Gard. Edinb. 18, 19 (1933), *p.p.*, quoad *Forrest* 13,428 et 14,735.

SZECHUAN. Hung-ya-hsien, 14 Aug. 1930, *W. P. Fang* 8221.

YUNNAN. On cliffs and humus-covered boulders on the Mekong-Salwin divide, 28°10'N., 3600 m., Oct. 1914, *Forrest* 13,428: "Prostrate shrub of 2-6 inches. In fruit, fruits deep blue." Open peaty pasture and on banks in *Rhododendron* thickets on the Mekong-Salwin divide, 28°12'N., 3600-3900 m., Aug. 1917, *Forrest* 14,735: "Matted shrub of 4-6 inches. Fruit deep clear blue."

UPPER BURMA. Chawchi Pass, common among rocks, etc., in cool shady places of the upper alpine woodland, 3300 m., 2 July 1920, *Farrer* 1676 (Herb. Edin.): "Flowers white. F.1737 is the same, from much higher up." Chawchi Pass, among mossy boulders and in silt, 3750 m., 18 July 1920, *Farrer* 1737 (Herb. Edin.): "See F. 1676. This is a higher-alpine state." Chimili woods, 3240 m., 4 Aug. 1919, *Farrer* 1191 (Herb. Edin.): "A prostrate trailer in moss, on boulders and silty banks of gullies in the upper woodland zone. Flower unknown, but the calyx round the Pyrolloid capsule develops (from dull brown purple) to a most glorious white-lined 5-lobed 'flower' of brilliant lapis-lazuli blue." (The leaves in this specimen are smaller and less green below than usual).

ASSAM. Delei valley, in the *Abies-Rhododendron* forest, 3000 m., 31 May 1928, *Kingdon Ward* 8266 (typus, Herb. Kew.): "A creeping

plant, crawling over slabs of rock. Flowers few, solitary, snow white." Delei valley, 28°15'N., 96°35'E., in the *Tsuga-Rhododendron* forest, 3000–3300 m., 23 Aug. 1928, *Kingdon Ward* 8562 (Herb. Kew.): "A creeping plant, growing on rocky outcrops with north exposure. 'Berries' bright blue." Sources of the Irrawaddy, Adung valley, 28°20'N., 97°40'E., 3000–3300 m., 10 June 1931, *Kingdon Ward* 9628 (Herb. Mus. Brit.); "Flowers pure white. The long thread-like stems form a carpet amongst moss under the *Rhododendron* bushes in open places, *Abies* forest. (Shoots and midrib of leaf setose.) See no. 9885.\*"

One of the numerous species detected as new by the late Dr. Stapf, who had used the epithet "myrtilloides" in manuscript: this name is, however, already preoccupied for a South American species. The present plant was included by Anthony under his very inclusive *G. sinensis*, but it is evident that this group requires somewhat more critical treatment. *G. hypochlora* can be readily distinguished from the plant which Anthony has designated as the type of *G. sinensis* by the thinner texture of the markedly obovate leaves, which frequently dry a very characteristic light clear green on the underside. The stems are occasionally sparsely and minutely white-puberulous when young.

7. *G. sinensis* Anth. in Notes Roy. Bot. Gard. Edinb. 18, 19 (1933) *pro parte*; Hand.-Mazz. Symb. Sin. 7, 793 (1936).

*G. trichophylla* Royle, var., Auctt. Edin. in Notes Roy. Bot. Gard. Edinb. 17, 51 (1929).

The following collections are an excellent match of the type specimen (*Forrest* 14,216) from the Tibeto-Yunnan frontier:

UPPER BURMA. Seinghku Wang, 28°18'N., 97°24'E., 3900 m., on limestone gravel or grassy slopes amongst dwarf *Rhododendron*, 10 July 1926, *Kingdon Ward* 7094 (Herb. Kew.): "Flowers cream, with red calyx. Stigma crimson."

ASSAM. Delei valley, 28°15'N., 96°35'E., 3300–3600 m., growing on steep earth screes and rocky faces, amongst scrub *Rhododendron*, 28 Aug. 1928, *Kingdon Ward* 8605 (Herb. Kew.): "Creeping plant, in fruit, berries dark rose." (Apparently growing in association with *G. thymifolia*, since sterile specimens of the latter were found mixed with this gathering.)

As indicated above, under *G. hypochlora*, I believe Anthony's conception of the present species to be heterogeneous. The following varieties are therefore proposed:

var. **maior** *Airy-Shaw*, var. nov. foliis subduplo majoribus plerumque oblanceolatis nec oblongo-obovatis usque 16 mm. (nec 8 mm.) longis et 5.5 mm. (nec 4 mm.) latis acutioribus nervis supra minus conspicue impresso-reticulatis.

*G. trichophylla* Royle, var., Auctt. Edin. in Notes Roy. Bot. Gard. Edinb. 14, 136 (1924).

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\* No. 9885 is not this species, but is *G. sinensis* var. *crassifolia* (p. 326).

*G. sinensis* Anth. l.c., p.p., quoad *Forrest* 12,938 et 20,040.

YUNNAN. In regione frigide temperata jugi Schöndsu-la inter fluvios Landsang-djiang (Mekong) et Lu-djiang (Salween), 28°4', sub fruticibus, substr. micoschistaceo, 3850 m., 22 Sept. 1915, *Handel-Mazzetti* 8243 (Herb. Edin.): "Fr. caerulei." Open sandy moist situations on the Kari pass, Mekong-Yangtze divide, 27°40'N., 3300 m., Aug. 1914, *Forrest* 12,938 (typus, Herb. Kew.): "Prostrate shrub of 10-12 inches. In fruit, fruits bright blue." Sine loc., *Forrest* 30,556 (Herb. Edin.). A smaller form of this variety, somewhat approaching the type of the species, is *Forrest* 28,035 (Herb. Edin.) from the Tali range, Oct. 1929.

S.E. TIBET. Tsarong: moist alpine pasture on the Salwin-Kiu-chiang divide, 28°24'N., 98°24'E., 3900 m., Aug. 1921, *Forrest* 20,040: "Prostrate or semi-prostrate shrub of a few inches. In fruit, fruits blue." (Also in UPPER BURMA; vide *Kingdon Ward* 6845, sub var. *crassifolia*, infra.)

var. **crassifolia** *Airy-Shaw*, var. nov. foliis nitidulis magnitudinis var. *maioris* sed crassioribus et manifeste obovatis, iis *G. hypochlorae* forma similibus sed minoribus saepe deflexo-apiculatis.

*G. sinensis* Anth. in Notes Roy. Bot. Gard. Edinb. 18, 19 (1933), p.p., quoad *Forrest* 19,286.

S.E. TIBET. On ledges of cliffs and humus-covered boulders on the Salwin-Kiu-chiang divide, 28°40'N., 98°15'E., alt. . . . , Oct. 1919, *Forrest* 19,286 (typus, Herb. Kew.): "Prostrate shrub of 1-2 inches. In fruit, fruits indigo blue."

UPPER BURMA. Advance Base, Seinghku Wang, 3000 m., on rocks in open meadows, 4 June 1926, *Kingdon Ward* 6845 (Herb. Kew.): "Dwarf prostrate undershrub with ascending stems. Flowers white, nodding, anthers bright yellow. Berries blue." (Flowering specimens of var. *maior* were found mixed with this gathering). Sources of the Irrawaddy, Adung valley, 28°20'N., 97°40'E., 3900 m., 29 June 1931, *Kingdon Ward* 9628A (Herb. Mus. Brit.): "Same as no. 9628?\*" Ibid., 3900 m., 31 July 1931, *Kingdon Ward* 9885 (Herb. Mus. Brit.): "A minute prostrate creeping plant, freely branched and forming an extensive and close film-like mat over the thick beds of moss in the Fir forest. Fruits globular, green at first, bright scarlet when ripe. Leaves, when young, with short bristles on the margin; mature leaves leathery, shining, dark green above, paler below, glabrous, margin minutely serrate. Young shoots with short adpressed crimson bristles or hairs. (Same as no. 9628.\*)" "

Ward's notes to his no. 9885 evidently refer in part to *G. suborbicularis* W. W. Sm., a small piece of which was found with the *G. sinensis* var. *crassifolia*. The latter is said to have blue fruits.

8. ***G. nivea*** (Anth.) *Airy-Shaw*, sp. nov., ab omnibus congeneribus Seriei *Trichophyllarum* ramulis dense minutissime albido-tomentellis

\* No; no. 9628 is *G. hypochlora* (p. 324-5)

facile distinguenda ; *G. sinensi* Anth. (typicae) proxima, sed folia angustiora et acutiora.

*G. sinensis* var. *nivea* Anth. in Notes Roy. Bot. Gard. Edinb. **18**, 20 (1933) ; Hand.-Mazz. Symb. Sin. **7**, 793 (1936).

S.E. TIBET. Tsarong : peaty, stony meadows on the Salwin-Kiu-chiang divide, 28°40'N., 98°15'E., alt. . . . , July 1919, *Forrest* 19,269 (typus, Herb. Edin.) : " Plant of 1-2 inches. Flowers white."

YUNNAN. Open ledges of cliffs, humus-covered boulders and stony slopes on the Mekong-Salwin divide, 28°10'N., 3900 m., Sept. 1914, *Forrest* 13,310 : " Prostrate shrub of 2-4 inches. In fruit, fruits white."

Quite distinct in its minute tomentum from all the other species of this group. The small leaves are about the same length as those of typical *G. sinensis*.

#### Series HISPIDULAE.

Folia subacuta, basi subcuneata ; thecae breviter biaristatae ; fructus albus (Japonia ; America bor.).....9. *hispidula*

Folia plerumque utrinque rotundata vel vix apiculata ; thecae exaristatae ; fructus ruber (China mer.-occ.)...10. *suborbicularis*

9. *G. hispidula* (L.) *Muhlenb.* Cat. Pl. Amer. Sept. ed. 1, 44 (1813), ed. 2, p. ? (1818) ; *Bigel.* Fl. Bost. ed. 2, 165 (1824) ; ed. 3, 175 (1840) ; *L. C. Beck*, Bot. N. & Middle States, ed. 1, 216 (1833) ; *Hook.* Fl. Bor.-Am. **2**, 36 (1834).

*Vaccinium hispidulum* L. Sp. Pl. ed. 1, 352 (1753), excl. syn. ; *Michx.* Fl. Bor.-Am. **1**, 228, t. 23 (1803).

*Arbutus filiformis* Lam. Encycl. Méth., Bot. **1**, 228 (1784).

*Arbutus thymifolia* Ait. Hort. Kew., ed. 1, **2**, 72 (1789).

*Oxycoccus hispidula* (L.) Pers. Syn. Pl. **1**, 419 (1805).

*Gaultheria serpyllifolia* Pursh, Fl. Amer. Sept. **1**, 283 (1814).

*Chiogenes serpyllifolia* (Pursh) *Salisb.* in Trans. Hort. Soc. **2**, 94 (1817).

*Glyciphylla hispidula* (L.) *Raf.* in Amer. Monthly Mag. 192 (1819).

*Schollera hispidula* (L.) *Steud.* Nomencl. Bot. ed. 1, 746 (1821) ;

*Roth* ex *Steud.* op. cit. ed. 2, **2**, 534 (1841).

*Phalerocarpus serpyllifolius* (Pursh) *G. Don*, Gen. Syst. **3**, 841 (1834) ; *Dunal* in DC. Prodr. **7**, (2), 577 (1839) ; *Klotzsch* in *Linnaea*, **24**, 68, (1851).

*Lasierpa hispidula* (L.) *Torr.* in Geol. Rep. New York, 152 (1839).

*Phalerocarpus hispidula* (L.) *Heynh.* Nomencl. **1**, 612 (1840-41).

*Chiogenes hispidula* (L.) *Torr.* et *Gray* ex *Torr.* Fl. New York, **1**, 450, t. 68 (1843) ; *Nieden zu* in Engl. Bot. Jahrb. **11**, 216 (1889) ; *Britton* et *Brown*, Ill. Fl. North. States & Can. **2**, 704 (1913).

var. *japonica* (*A. Gray*) *Makino* in Bot. Mag. Tok. **18**, 19 (1904) ; *Miyoshi* et *Makino*, Pocket-Atl. Alp. Pl. Jap. **2**, 104, t. lii. fig. 301 (1907).

*Chiogenes hispidula* Miq. in Ann. Mus. Bot. Lugd.-Bat. 1, 29 (1863); Maxim. in Mém. Biol. 8, 609 (1872) et in Bull. Acad. Imp. Sci. St. Pétersb. 18, 43 (1873); Franch. et Sav. Enum. Pl. Jap. 1, 282 (1875).

*Chiogenes japonica* A. Gray, Synopt. Fl. North Amer. 2, 26 (1886); Drude in Engl. u. Prantl, Nat. Pflanzenfam. IV. 1, 47 (1889); Nakai in Nak. et Koidz. Trees & Shrubs Jap. Prop. ed. 2, 1, 220 (1927); Makino et Nemoto, Nipp.-Shokub.-Sôran (Fl. Jap.) ed. 2, 864 (1931); Terasaki, Nipp. Shokub. Zufu (Jap. Bot. Ill. Alb.) 907 (1933).

Differs from the American plant in the somewhat more obovate leaves with more cuneate base and in the shorter and less deeply bifid prolongations of the anther-thecae.

The slight tendency of the ovary to become inferior is apparently responsible for the chequered nomenclatural career of this species. An observation of Lamarck's (1784, *l.c.*), however, shows that this tendency is really very slight: "Les fleurs . . . ont . . . leur ovaire situé dans la corolle, & non au-dessous, comme je l'ai vu bien distinctement." Torrey (1843, *l.c.*) remarks that the calyx becomes more adnate to the ovary as the fruit ripens. It is clear, however, that too much importance should not be attached to this character in *Gaultheria*. The same tendency is seen in *G. semi-infera* (C. B. Clarke) Airy-Shaw (Sect. *Leucothoides*), a species closely related to *G. discolor* Nutt. whose status as a *Gaultheria* is beyond question. It is strange that Niedenzu, apparently the first botanist\* to place *Chiogenes* in the *Gaultherieae* (1889, *l.c.*), did not attach more importance to the close morphological resemblance between *Ch. hispidula* and *Gaultheria trichophylla*. He observed (*l.c.* 190) a similarly 1-layered upper epidermis in these two species, but found on the whole a closer general agreement in the leaf-anatomy of *Chiogenes* with *Pernettya* than with other species of *Gaultheria*. Torrey,† Hooker and others comment on the similarity in the aromatic flavour of the fruits and leaves of *Chiogenes* to that of *Gaultheria procumbens*, placed in the present arrangement, on morphological grounds, at the opposite end of Sect. *Eugaultheria*.

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\* Asa Gray, though placing *Chiogenes* in *Vacciniaceae*, remarked that it was a genus "naturally related rather to *Gaultheria* and *Pernettya* than to *Vaccinium*" (Synopt. Fl. N. Amer. ed. 2, 2 (1), 26: 1886). Bentham and Hooker were mistaken in stating (Gen. Pl. 2 (2), 564: 1876) that *Chiogenes* formed a connecting link between *Vacciniaceae* and *Ericaceae*, since it is in no way related to any species that has ever been referred to the former group.

† Dr. Torrey was evidently much puzzled by the structure of the fruit of this species. The following notes in his handwriting are attached to two specimens labelled "*Oxycoccus hispidulus* Pers." from Hooker's Herbarium at Kew: "I have made a mistake in describing the fruit of this plant. It is certainly a berry and is nothing like *Gaultheria*. 'Tis nearer *Oxycoccus* than any other genus." "The fruit is incorrectly described in my Flora. It is by no means a *Gaultheria*—neither does it agree in all respects with *Oxycoccus*."

10. *G. suborbicularis* W. W. Sm. in Notes Roy. Bot. Gard. Edinb. 8, 186 (1914) et *l.c.* 14, 125, 157, 212, 362 (1924); Hand.-Mazz. in Anz. Akad. Wiss. Wien, Math.-Nat. Kl. 1923, 60, 185 (1924); reimpr.: Pl. Nov. Sin., Forts. 23, 6 (1924); Hand.-Mazz. Naturb. Südwest-China, 191 (1927), et Symb. Sin. 7, 793 (1936).

Forrest collected this species a year after Kingdon Ward's original discovery, as well as after 1918; the notes to Forrest's earlier expedition have, however, not yet been published, and are therefore given here.

YUNNAN. Bei Ma Shan, Mekong-Yangtze divide, 28°20'N., 3900 m., on cliffs and boulders, rare, Aug. 1914, *Forrest* 13,283 (Herb. Edin.): "Trailing shrubby plant of 6-10 inches. In fruit, fruits bright crimson."

This interesting species bears a close resemblance to small slender specimens of *G. nummularioides* D. Don, but a glance at the bracteoles immediately discloses its true affinity. Both Smith and Handel-Mazzetti refer to the flowers as pentamerous, but I have been unable to detect any but tetramerous ones on the specimens available, and Dr. Stapf has also noted them as such on the three Forrest sheets in Herb. Kew. In view of the close relationship of this species with *G. hispidula* (L.) Muhlenb., in which the flowers are regularly tetramerous, it is probable that the occurrence of pentamerous flowers in *G. suborbicularis* is at least rare.

Handel-Mazzetti (1927, *l.c.*) speaks of the *fleshy lobes* of the red fruiting calyx. This is undoubtedly true of the "sky-blue" fruits of *G. trichophylla*,\* referred to in the same passage; but, if it is safe to judge from dried specimens, the calyx-lobes in *G. suborbicularis* appear *not* to become fleshy, or only slightly so, while the calyx-tube enlarges very considerably into a berry-like structure, with the small almost unchanged calyx-segments persisting at the apex. A similar process occurs in *G. hispidula*, the capsule being almost completely surrounded and hidden, in which state the "fruit" has much the appearance of an inferior berry.

*Gaultheria hispidula* and *G. suborbicularis* represent at once the most reduced and the most advanced type within the genus. The completely prostrate habit, small size of all parts, tetramerous flowers, reduced anther-appendages, and tendency to perigyny are all evidences of this. A rather similar habit has been adopted in the series *Nummularioidae*, but reduction has not proceeded so far, since there is no observable leaning in the direction either of tetramery or of perigyny.

#### Section v. *Gymnobotrys*.

An essentially Malayan group, species being known from Southwest China, Formosa, the Philippines, Indo-China, the Malay

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\* Probably the plant was not *G. trichophylla* itself, which appears to be rare in Yunnan, but one of its close allies.



Peninsula, Sumatra, Java and New Guinea. The branches are usually somewhat zig-zag; the leaves of a very uniform type, ovate to lanceolate, the base cordate or at least rounded (rarely subcuneate), the apex more or less caudate-attenuate. Except in *G. hirta* Ridley, from Perak, the indumentum is scanty, giving the plants a characteristically clean, smooth, bare appearance, which is enhanced by the rather small size of the bracts and the absence of perulae at the base of the inflorescence. The racemes are often almost as long as their subtending leaves, and the long, loosely spaced pedicels contribute towards the lanky aspect of these species.

Copeland (*l.c.* 60) has provided a tentative key to the group, and has included therein *G. celebica* J. J. Sm. (Celebes), *G. Pullei* J. J. Sm. and *G. calyculata* Wernh. (New Guinea); but, although the bracteoles are opposite and apical, the inflorescences are terminal, more or less leafy racemes, or panicles, and the leaves much smaller and of a different type, and the true affinity is evidently with *Leucothoïdes* through *G. celebica* and *G. punctata*. It is not clear why Copeland has separated *G. novaguineënsis* J. J. Sm. from *G. Pullei* and *G. calyculata* and placed it with the "allies of *G. nummularioides*": from the key to his three series (*l.c.* 57) it is apparently because *G. novaguineënsis* has "leaves generally under 2 cm. long"; but in other respects it seems closely allied to the two species mentioned.

Copeland is no doubt right in including *G. intermedia* J. J. Sm. in this group. I do not believe it is a hybrid between *G. leucocarpa* Bl. and *G. punctata* Bl., as suggested by Dr. J. J. Smith.

The origin of this section is probably to be sought in the same stock as that from which Sect. *Leucothoïdes* is derived and which is represented at the present day by the genus *Leucothoë* (excluding *Eubotrys* and Sect. *Eubotryoïdes*), the species of which show a markedly discontinuous distribution indicative of an ancient type (*cf.* Sect. *Brossaeopsis*, p. 309-10). The similarity in habit, leaf-shape and inflorescence is apparent even from casual inspection.

The writer wishes to record here his indebtedness to the late Dr. Otto Stapf for the permission, accorded before his death, to make use of a provisional MS. key to many of the Asiatic species of *Gaultheria* which he had drawn up in the course of his work for the Botanical Magazine (*vide* tt. 9174, 9228). It is greatly to be regretted that Dr. Stapf did not live to publish the complete results of his researches, since the genus was one in which he was especially interested, and also one with whose Old World representatives he was particularly well acquainted.

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#### XLIV—MISCELLANEOUS NOTES.

The George Robert White Medal of Honour has been bestowed on the Director, Sir ARTHUR W. HILL, by the Massachusetts Horticultural Society.

**Wayside Trees of Malaya.\***—Mr. Corner is to be congratulated on having produced this very useful book with its volume of excellent illustrations of over 250 different species of trees. As many as 950 species are described and in addition to the full descriptions a great deal of useful and interesting information is given about the trees and their uses. As a further aid to the student the author has added a large number of very useful text figures, both in the introductory portion and under the genera, to illustrate important characters in flowers, fruits or leaves. The volume of text is divided into four parts. The first consists of a general account of how to name trees, giving details about the various organs—leaves, flowers, fruits, etc.—which are used in classification, followed by a general account of Malayan vegetation and of the trees of local interest in the different States with their localities. The second part of 40 pages is entirely occupied by elaborate and carefully constructed keys to the families and genera, which are constructed on distinctly original lines and should enable the non-botanist to identify any of the trees described without undue difficulty, especially as Mr. Corner has, as far as possible, selected characters which can be readily observed and are available throughout the year. One small criticism of the keys is of the constant use of the words “not so” as the alternative phrase in the couplet of distinguishing characters. In the first place it is not always easy to appreciate to what it applies, and in many cases it certainly does not apply to the whole of the statement with which it is contrasted. No doubt the use of the term has shortened the key, but its usefulness has been somewhat impaired in consequence.

The bulk of the book (pp. 95–726 incl.) consists of descriptions of the various families, genera and species, and the arrangement is alphabetical in all cases. The gymnosperms are placed at the end of the flowering trees, and the volume concludes with indices of the English, Malay and botanical names and of botanical and descriptive terms. The derivation of the generic and specific names which are given under the descriptions is a welcome feature which will be generally appreciated.

The student should have no difficulty in running down any tree he may be examining, as in addition to the Key in Part II, keys to the genera, where necessary, are given under each family and keys to the species, under the genus. In addition to the full descriptions of the genera and species, interesting particulars are given of the various species, whether they are native or introduced, and also many points of biological and morphological importance, as well as information about their economic value.

We are glad to recognise on the cover one of the Berok monkeys, which Mr. Corner has so successfully trained to collect tree specimens for him. The significance of the picture may not be understood

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\* *Wayside Trees of Malaya*, by E. J. H. Corner, M.A., F.L.S., Assistant Director of Gardens, Straits Settlements. Vol. I text, Vol. II plates, printed at Government Printing Office, Singapore, 1940, \$10.

outside Malaya, nor the allusion to it on the page facing Plate I in the second volume.

The volumes are a great tribute to the Government Printing Office, Singapore. The printing of the text and the reproduction of the fine photographs leave nothing to be desired.

**The Indigenous Trees of Uganda.\***—The large number of excellent photographs which adorn the pages of this book is a striking and very welcome feature. There are forty-two of them, and those of *Crataeva Adansonii* facing p. 36, *Albizzia zygia* (p. 122), and *Musanga Smithii* (p. 150) make very pretty landscape pictures. The seventy-six line drawings, however, would have been much improved had they shown more botanical details.

For several years Kew has assisted Mr. Eggeling by supplying determinations of his collections, and for this help, as noted in the foreword, we have been well rewarded, since it has resulted in the production of this important work on the indigenous trees of the Protectorate. Descriptions of the more obvious characters of each species are given, and keys for their determination, whilst their distribution in Uganda is indicated. Considering the excellent format of the book, one is rather surprised and not a little pleased to find that it has been possible to print such a work at a place resting almost on the equator, and the author and Government Printer at Entebbe are to be warmly congratulated on the result.

It is to be hoped that in other books of this kind the recording of tentative herbarium determinations will not be included. Many of them are very ancient and no useful purpose is served by their publication.

Mr. Eggeling has been an assiduous collector of Uganda trees and shrubs, and it is mainly his own specimens which are quoted throughout the book. It seems a pity that those gathered by others could not also have been mentioned, for instance by such pioneers as M. T. Dawe, E. Brown, and E. G. Bagshawe, who all made large collections, and later R. Dümmer and J. D. Snowden, to mention only a few.

With respect to the arrangement of the families, the author of the book, being a forester, should know best which is most suitable for foresters. In my opinion, however, the alphabetical arrangement rather implies a lack of knowledge of taxonomic botany on the part of the forester, which some would perhaps resent, considering the comprehensive training they receive nowadays at the schools of forestry at Oxford, Edinburgh and other places. And if the forester has not the requisite botanical knowledge, he can scarcely think of his trees in the first place in terms of their *families*. He

\* The Indigenous Trees of the Uganda Protectorate, by W. J. Eggeling, B.Sc., Ph.D., Senior Assistant Conservator of Forests, Uganda Protectorate, with a Foreword by Sir Arthur Hill, K.C.M.G., F.R.S., etc., being a thesis approved for the Degree of Doctor of Philosophy in the University of Edinburgh; Government Printer, Entebbe, Uganda, 1940, price 15s. net.

might know the generic name, and would then turn to the excellent index provided to find it. Or, failing knowledge of the generic name, he will turn to the key. But in this there is a very unfortunate omission. The beginning of the key to the *Dicotyledones* on p. xiv reads as follows :—

- “ 10. Gynaecium composed of 2 or more separate or nearly separate styles and stigmas.....11  
 Gynaecium composed of 1 carpel or 2 or more united carpels with free or united styles, or if carpels free below then the styles or stigmas united.....12 ”

The first paragraph should read “ Composed of 2 or more separate or nearly separate *carpels* with separate styles and stigmas.” That is how it is written in Hutchinson’s *Families of Flowering Plants*, from which the key has been mainly adapted. As the key stands many of the families included in No. 12 might equally well be referred to No. 11. For example, if we try to run down the *Hypericum* figured opposite p. 85, it will most certainly be considered to belong to No. 11, because there are two or more separate styles and stigmas ; and if we follow the key further *Hypericum* will be referred to *Annonaceae*, a family in which it has not hitherto been placed. This mistake is, therefore, particularly regrettable, and those who possess a copy of the book should make the addition as soon as possible ; after this the key seems to be quite satisfactory.

J. HUTCHINSON.

**Gardening without Soil.\***—“ If you are relatively inexperienced in growing plants, you may find soil a better medium for germinating certain seeds than the litter seedbed. This is more a question of convenience than anything else.” It is rather surprising to find this statement in a book intended to encourage the cultivation of plants for commercial and ornamental purposes with their roots immersed in an aqueous solution of mineral salts rather than in the soil in which we are more accustomed to see them grow. This and other statements are indicative of the author’s honesty in acknowledging that soilless cultivation presents difficulties peculiar to itself in spite of advantages such as the elimination of soil pests and diseases. That considerable interest has been aroused in this subject may be seen from the number of books which have recently been written about it, some of which have already been noticed in the Bulletin (K.B. 1938, p. 314, 1940, 139). The author of the book now under review is one of the pioneer workers in the development of soilless cultivation beyond the well-known method of water culture, which has been familiar to all students of plant physiology for many years. When one compares the rather sickly plants in jars of culture solution which are so often associated with water culture experiments with the tanks of flourishing tomatoes, potatoes and other crops

\* The Complete Guide to Soilless Gardening, by W. F. Gericke, London, Putnam, 1940, pp. xvi+285, 60 figures. Price 12s. 6d. net.

which are figured in this book, one must agree that very considerable advances on the older methods have been made. For this reason alone Mr. Gericke's book is worthy of careful study by those engaged in teaching plant physiology. It should also be read by anybody interested in the mineral nutrition of plants, because much of the information which is given will be found useful by those who grow plants in soil in the ordinary way. The practical value of cultivation without soil will vary in different parts of the world, being most useful where high light intensity is accompanied by poor soil or even by desert conditions. In such localities the new technique may eventually play a part of some importance, but elsewhere it seems doubtful whether it will successfully compete with more orthodox methods of cultivation.

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C. R. METCALFE.

This number completes the issue of the Kew Bulletin for the year 1940. It consists of seven numbers instead of ten, the reduction being due to the shortage of paper and also to the depletion of the scientific staff of Kew in consequence of the war.

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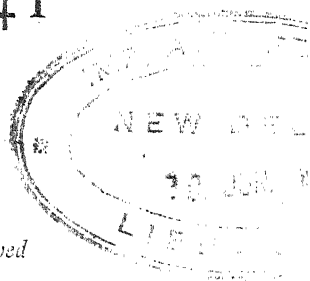
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Royal Botanic Gardens, Kew

Bulletin of  
Miscellaneous Information  
No. 3 1941

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14923

LONDON

PRINTED AND PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE

To be purchased directly from H.M. STATIONERY OFFICE at the following addresses:

York House, Kingsway, London, W.C.2; 120 George Street, Edinburgh, 2;

39-41 King Street, Manchester 2; 1 St. Andrew's Crescent, Cardiff:

80 Chichester Street, Belfast:

or through any bookseller

1942

• Price 1s. 6d. net

THE SEPARATE NUMBERS OF THIS VOLUME WERE  
PUBLISHED ON THE FOLLOWING DATES:

			1941	Price
No. 1	...	...	November 8	9d. Net
No. 2	...	...	November 22	4s. od. ,,
			1942	
No. 3	...	...	March 9	1s. 6d. ,,

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# BULLETIN OF MISCELLANEOUS INFORMATION No. 1 1941 ROYAL BOTANIC GARDENS, KEW

## I.—REVIEW OF THE WORK OF THE ROYAL BOTANIC GARDENS, KEW, DURING 1940.

### General

The amenities of the Royal Botanic Gardens as a place of resort for the public were maintained with little alteration throughout the year. Floral displays out-of-doors continued much as usual, and the plant-houses and museums were kept open except for occasional periods when repair work was made necessary by damage to glass through bombing attacks. The irreplaceable contents of the North Gallery were, however, removed to a place of safety and the Gallery has been closed.

Despite a considerable number of bombs which were dropped at various times in the Gardens and nearby, the structural damage has been confined almost entirely to broken glass, and the destruction of plants from the resulting exposure has, so far, been much less than at one time seemed likely, though there have been considerable losses in the Palm House.

Scientific activities have naturally been curtailed. The difficulties of transport have led to a great diminution in the amount of material, both living and dried, sent out or received, and it is not proposed to issue the usual detailed lists of consignments.

The number of men from Kew serving with the armed forces at the end of the year was 46. The Assistant Director, Mr. J. S. L. Gilmour, Mr. B. L. Burt, and several members of the clerical staff have been loaned to other Government Departments.

To replace the Student Gardeners called up for service, a number of fully-trained women gardeners are now being employed.

**PUBLICATIONS.** The shortage of paper made it necessary to restrict the distribution of the Kew Bulletin, of which seven numbers were published during the year.

**AIR-RAID PRECAUTIONS.** The A.R.P. organization has been maintained and strengthened to meet changing conditions.

**HOME GUARD.** When the Local Defence Volunteers were formed, in May, 1940, a Platoon of the Richmond Company was at once formed from amongst the employees of the Gardens. Sir Geoffrey Evans, Economic Botanist, was gazetted Platoon Commander. At one time the strength of the Platoon was over 50 men, but the number was later somewhat reduced by the demands of regular military service. In addition to patrolling the Gardens



area the Platoon furnished Guards for various important points in the neighbourhood. At a later date the Kew Gardens Platoon was disbanded and its members were absorbed into other platoons, and early in 1941 the Richmond Company was raised to the status of a Battalion, Sir Geoffrey Evans being gazetted Commanding Officer, with the rank of Lieutenant-Colonel.

### The Gardens

GENERAL.—The year will be long remembered for the extremely hard weather experienced in January, February and March, lower temperatures being maintained over a longer period than had been experienced for the past 50 years. Many specimens, both old and young, of tender trees and shrubs were either killed entirely or cut to the ground, but the losses were not so great as was expected. The annual rainfall was 25.32 inches, but unfortunately this was not evenly distributed. After several dry periods, heavy rains fell in the late summer and early autumn. 31,106,000 gallons of river water were used during the dry periods, about the average of the past few years. Heavy snow-falls occurred in January, and snow lay on the ground for many weeks, but fortunately no great damage to Conifers resulted from this cause.

ARBORETUM.—Several trees were blown down or damaged by high winds, chief amongst them being the interesting female specimen of the "Lombardy Poplar," *Populus nigra* var. *italica*, growing near Kew Palace. Some young trees, cuttings of this specimen, are now planted in the Poplar collection and elsewhere. Several large Beech trees came down and were found to be badly decayed at the roots; as many of the old Beeches are attacked by fungus, further losses must be expected among them. The chief losses due to frost were among the *Cistus*, *Helianthemums* and the tree Heaths, *Erica arborea*, *E. lusitanica*, and in a lesser degree *E. mediterranea*.

In the early spring over 100 *Berberis*, grown from seeds collected in Asia, were planted in the Berberis Dell, many being new species recently described by the Rev. L. W. A. Ahrendt.

Wartime conditions necessitated the ploughing up of the large lawn near Kew Palace. This area, about  $1\frac{1}{2}$  acres in extent, was planted with potatoes. The varieties grown were Great Scot, Arran Chief, Gladstone and Long Keeper, and the yield was just over 12 tons.

TEMPERATE HOUSE.—The Himalayan and Chinese species of *Rhododendrons* as well as many fine hybrids flowered exceptionally well, large plants of *R. Griffithianum*, *R. Maddenii*, *R. Wightii*, *R. Falconeri*, *R. formosum*, *R. Dalhousiae* and *R. Veitchianum* being very fine; *R. Griersonianum* and *R. eriogynum* also produced many trusses of their brilliant scarlet flowers. One of the finest species to flower was *R. Taggianum* from Upper Burma. This was raised from seed collected by Forrest in 1925; the flowers are large,

tubular and ivory-white. Later in the summer another new Burmese species, *R. Kyawi*, bore large trusses of bright scarlet flowers. The large specimen of the Chilean Honey Palm, *Jubaea spectabilis*, transplanted in the summer of 1938, has not only received no check from the move, but shows the benefit of a change in the increased vigour and richer colour of the young growth.

The Acacias were undamaged by fogs and made a fine display of flower from January until the end of April. Other plants of interest which flowered well were *Luculia gratissima*, *L. Pinceana*, *Prunus campanulata*, *Camellia reticulata* and *C. saluenensis*.

Conditions from November onwards were made very difficult by cold winds and frost entering the houses, owing to the destruction of glass through enemy action. Though the extensive damage was repaired as quickly as possible, a few specimens suffered from frost, and probably many of the older tree Rhododendrons will be found to have suffered considerably in course of time. The collection of half-hardy trees and shrubs in the sheltered recesses outside the house, which in ordinary winters are sufficiently protected, suffered severely from the hard frosts early in the year, especially those from Australia, New Zealand, South America, California and the Himalayas. Old-established plants of *Olearia* (many species), shrubby Senecios from New Zealand, and all the species of *Leptospermum* were killed, and also a large specimen of *Ozothamnus antennarius*, over 30 years old, which was considered to be the hardiest Australian plant in this country.

TROPICAL DEPARTMENT.—No new work or extensive alterations have been possible during the year, the safeguarding of the collections during the later part of the year when the glasshouses were damaged being the chief concern. Many tropical plants in the Palm House have been killed, but thanks to the mild winter, the death roll, considering the amount of glass broken, was comparatively slight. Important economic plants have been propagated, and fairly large stocks of *Derris elliptica*, *Licania rigida*, *Theobroma Cacao* and several species of *Musa* have been raised.

Among plants of special interest which flowered during the year were *Streptocarpus Vandeleuri*, a native of South Africa, presented by the John Innes Horticultural Institution, *Dendrobium Kingianum*, *D. Fairfaxii*, *D. delicatum*, *D. aemulum*, and *D. gracilicaule*, all charming species of orchids collected by Mr. F. A. Weinthal in Australia. *Theobroma Cacao* var. *Forestero* and *Piper nigrum* fruited well in the Economic House.

The Tropical Water Lily House (No. 15) was badly damaged by blast from a bomb which fell some distance away, and was out of use all the winter. The broken vertical lights have been replaced by thick cellophane (March, 1941), and the house is now in normal use.

HERBACEOUS DEPARTMENT.—In the Rock Garden, a few minor improvements and alterations were made. Despite the hard

weather very few plants were lost, though some, including a few shrubs, native of the warmer regions, were killed. Many plants flowered exceptionally well, especially the Primulas, *Meconopsis*, Penstemons, and several species of *Gentiana*. Bulbous plants also made a fine display in the Alpine House, the species of *Fritillaria* and Tulips being particularly good.

In the Iris Garden, beds were re-soiled and some of the newer varieties were planted.

Plants of special interest which flowered were *Scutellaria baicalensis* (Siberia), *Schizocodon macrophylla* (Japan), an attractive plant with large pink bell-shaped flowers, *Callirhoë involucreta* (North America), *Brittonastrum mexicanum*, raised from seed sent by Mr. E. K. Balls from Mexico, and *Lathyrus splendens*.

DECORATIVE DEPARTMENT.—The displays of spring and summer bedding plants were up to the standard of normal times, but the severe weather in the early months of the year resulted in the failure of most of the Wallflowers, *Myosotis* and Aubrietias. The Tulips, however, were good. Many roses in the Rose Garden, especially some of the hybrid Teas, suffered severely from the frost. Among the Lilies, *L. Marhan*, *L. auratum* var. *platyphyllum* and *L. Henryi* made a fine display.

In the conservatory *Prostanthera Sieberi* flowered profusely for several weeks, and received an award of merit when shown before the R.H.S. Floral Committee on April 2nd, 1940.

In connection with the "Grow More Food Campaign" a ten-rod demonstration plot was made near the Palace (see Annual Review for 1939). Demonstrations on soil preparation, arrangement and planting of crops, were given monthly. These proved popular with the general public. Produce grown on the plot was sent to the Royal Hospital, Richmond, and to the Kew and Richmond Evacuees' centre. The value of the produce came to over £12, which slightly exceeded the cost of planting and maintenance.

RAINFALL.—Rainfall recorded at the Royal Botanic Gardens, Kew, during 1940 :—

	Inches		Inches
January	... 2.33	July	... 2.46
February	... 1.62	August	... 0.06
March	... 3.15	September	... 1.44
April	... 1.60	October	... 2.62
May	... 1.21	November	... 6.65
June	... 0.95	December	... 1.23
Total 25.32 inches.			

The total for 1939 was 28.50 inches.

### Museums

Museums No. I and No. IV suffered a good deal from enemy action, the damage being mainly broken windows. Much of

the spirit material and the more valuable exhibits had been removed. The pictures in the Marianne North Gallery had all been stored away before the building was damaged by blast from a bomb which fell in the Kew Road.

Among special exhibits displayed in Museum III, the following may be mentioned :—

The importance of the Soy Bean in War Economics, and the uses of desiccated coconut, particularly with regard to confectionery. For these exhibits trade firms contributed most liberally.

Early in the year, in connection with the Model Allotment nearby, and for the benefit of allotment holders, wax models of various kinds of vegetables were exhibited ; living examples of common garden pests and diseases of vegetables were also staged with instructions as to their prevention or cure.

A number of photographs showing the effects of the remarkable ice storm in January on trees and shrubs in the west country were kindly supplied by Mr. W. R. Price, Mr. R. C. B. Gardner and Mr. T. Thomson.

Miscellaneous enquiries related to the use of certain weed seeds (screenings from cereals) in poultry rations ; livestock poisoning through excessive feeding of charlock seed ; the use of various little-known vegetable products (e.g., *Montbretia* corms) as food for livestock ; and many enquiries were received about fibres and paper-making materials, such as Ramie, wheat and rye straw, and Spanish reed (*Arundo Donax*).

Special assistance has been given to a Dutch national who is producing in this country high-grade artists' charcoal from home-grown wood, and also elder pith, both of which were mainly imported.

Advice has been given on the cultivation of Drug Plants to correspondents in Great Britain and the Empire, especially India, Kenya and Canada. Among the more important drugs dealt with were Belladonna, Henbane, Stramonium, Digitalis, Squill, Cascara and Ergot. A member of the staff attended conferences on the cultivation of drug plants held by the Ministry of Health. (A special Vegetable Drugs Committee has since been formed, upon which Kew is represented by the Director.) The co-operation of the Boy Scouts Association was obtained in the collection of *Colchicum* corms for cultivation at Kew, to serve as a reserve of this valuable drug plant. Owing to the dry season the work of collection was arduous, but the Scouts showed great keenness, and about one-third of an acre has been planted with the corms.

Many enquiries concerning the value of substitute plant products were received. These included the use of horse chestnuts, acorns, hips and haws, and other seeds and fruits, as food for stock, and the possibility of obtaining sugar from the sap of the Sycamore, *Acer pseudoplatanus*. A substitute for Agar-agar has been pre-

pared, which unfortunately is not suitable for bacteriological work, but may be of value for other purposes.

Information has been given on the sources and availability of light timbers, on coniferous oleoresins for the preparation of anti-freezing dope for aeroplanes; timbers and other products for the manufacture of a self-sealing boat; adhesives for hand grenades, etc.

A member of the staff has made a special study during the year of the different kinds of hedge and barrier plants (live fences) utilized in warm countries throughout the world. This has been stimulated by the increasing importance now attached to certain types of hedge in soil erosion control and by the fact that wire fences are less easy to procure and more expensive owing to the war. Some 400-500 species have been recorded in cultivation in tropical and sub-tropical countries for this purpose, about half of which are spinous.

Among contributions to the Museums in 1940 are the following :—

Mr. G. P. Madden, Bovey Tracey: Section of trunk of a fine specimen of *Eucalyptus globulus*, together with photographs of the tree before the great frost, which caused its death, and after felling. Also three hand-made boxes of native workmanship containing hand specimens of Ceylon timbers.

Mr. R. C. B. Gardner, Stratford-on-Avon: photographs of damage caused by the ice-storm in the west of England in January.

Dr. D. Guthrie, 35 Drumsheugh Gardens, Edinburgh: photograph of the "Tree of Hippocrates," *Platanus orientalis* Linn., on the island of Cos.

Messrs. Pitman, Ltd., Vitaland, Four Oaks, Warwickshire, and Messrs. Soy Foods, Ltd., Rickmansworth: Soy Bean products.

Mr. W. R. Price, Hon. Sec., Cotteswold Naturalists' Field Club: photographs of ice-storm.

Mr. H. N. Ridley, Kew: two walking-sticks with carved heads from Timor Laut; walking-stick of *Borassus*.

Messrs. Salamon and Seaber, Oak Avenue, Hampton, Middlesex: sample of Greek Thyme (*Thymus capitatus*).

Mrs. T. E. Stephenson, 75 Carlisle Mansions, Westminster: 20 water-colour paintings of tropical flowers at Singapore—now forming an attractive exhibit in No. III Museum.

Miss E. Thompson, Museums Staff, Kew: very old example of a Meerschaum pipe.

Mr. T. Thomson, University College of North Wales, Bangor: photographs of damage caused by the ice-storm in the Ceiriog District, Denbighshire.

Messrs. J. H. Vavasour and Co., Ltd., Ceylon House, E.C.3: samples of desiccated coconut and manufactured sweets and biscuits from other firms; sample of Ceylon copra and coconut oil.

## Jodrell Laboratory

The greater part of the work of the Laboratory during 1940 was concerned with investigations on economic plants and plant products of many kinds. Amongst material submitted for identification were dandelion and chicory roots, a tea substitute, and other drugs and foods, some of which were captured in the operation of the blockade of enemy countries. Samples of watchmaker's pegwood, artist's charcoal and elder pith were also examined microscopically. These materials, which have hitherto been imported, can now be prepared in this country, and a small industry has been started.

An investigation was carried out, in collaboration with the National Physical and Chemical Laboratories and the Imperial Institute, of the mechanical properties of the fibre from nettle stems (*Urtica dioica*) and other native plants, and of methods of extraction. The nettle fibre has been found to be suitable for the manufacture of high-grade paper, and possibly of textiles, while the leaves are commercially valuable for the extraction of chlorophyll. Arrangements were made for the extensive collection of this abundant raw material during 1941.

The preparation of a new work on the Vegetative Anatomy of the Dicotyledons has continued steadily. An account of the work done at Kew in recent years on the protection of certain greenhouse plants from fog and atmospheric pollution has been prepared, and will be published in the Annals of Applied Biology.

The number of visitors working in the Laboratory was of course much smaller than usual. Amongst others were Dr. C. A. Pratt (Economic Botany and Ecology), Dr. L. Portheim (Growth-substances and the Cultivation of Cacti in Water), Dr. Bhaduri (Cytology), and Mr. E. J. Hewitt (Growth-substances).

## Herbarium and Library

During 1940 the ordinary work of the Herbarium was seriously hindered by war-time conditions. It had been decided that as many as possible of the type specimens should be removed to a place of safety, and the work of locating and extracting the types, which had begun in 1939, took up a great part of the time of the whole scientific staff throughout most of the year. In addition, the fire-fighting and first-aid organizations had to be maintained.

With these extra duties and interruptions, and with several members of the staff engaged in military or other war service, there was little time for ordinary work. In spite of this, small collections were identified and certain items of research were completed or kept in progress. The compilation of Supplement X of the Index Kewensis was continued, and the Supplement to Pritzels Index Londinensis, covering the years 1929-1935, was completed,

the two volumes comprising the Supplement being published in January, 1941.

The location and extraction of type specimens proved a very heavy task. In selecting specimens the term "type" was interpreted in a wide sense so as to include co-types and type numbers. Occasionally, plants of exceptional interest, which were not types, were also extracted. Owing to the presence of synonyms, misplaced sheets, and other unexpected difficulties, it was usually necessary to examine every sheet in the covers. The work was carried out on the basis of the main geographical divisions in which the specimens are arranged, with the exception of certain groups dealt with by specialists. In order to avoid overlapping, botanists started at different selected points in the three wings. Special strong folders, with red margins easily seen on opening the cabinets, were employed, to simplify the process of extraction after the selection of sheets had been completed. Some idea of the magnitude of the task, and of the richness of the Kew Herbarium in type specimens, may be gathered from the fact that about 100,000 special covers were used for Wing B and about half of Wing C.

The increasing severity of night raids over London in the autumn made it clear that the safeguarding of type specimens alone was not a sufficient precaution, and it was decided to move as much as possible of the priceless contents of the Herbarium and Library into the country. The work was begun in the late autumn, and almost the whole contents of the two older wings B and C—comprising the Dicotyledons from *Compositae* onwards and the Monocotyledons, the *Pteridophyta* and *Bryophyta*, together with many of the books, have now been safely removed. The following members of the staff have accompanied the specimens to their new homes, and are continuing as far as possible their regular work: Messrs. Sprague, Turrill, Summerhayes, Ballard, Hubbard, Shaw, Nelmes, and Miss M. L. Green.

Little new material has been received during the year, but so far as is known only one consignment has been lost en route. Apart from the breakage of a considerable number of windows neither the Herbarium building nor its contents have suffered any damage up to the present time (June, 1941).

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## II.—CONTRIBUTIONS TO THE FLORA OF THAILAND. ADDITAMENTUM LIV.\*

**Euphoria scandens** Winit et Kerr (Sapindaceae—Sapindeae); species *E. obtusae* (Pierre) Rdlk. affinis, habitu scandente foliis minoribus distinguitur.

*Frutex* scandens; ramuli teretes, juventute subtiliter fusco-velutini, cito glabrescentes. *Folia* paripinnata, 4-5-juga, 9-20 cm. longa; petiolus 1.7-3 cm. longus, teres, juventute fusco-puberulus,

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\* Continued from K.B. 1940, 186.

mox glabrescens; rhachis similis, internodiis 1.5-2.3 cm. longis; petioluli 1-1.5 mm. longi, puberuli; foliola opposita vel alterna, in quoque jugo sursum gradatim majora, ea jugi imi ovalia, basi apiceque rotundata, interdum apice leviter emarginata, ad 3.5 cm. longa et 2.5 cm. lata, jugi summi obovata, basi acute cuneata, apice rotundata, ad 6.8 cm. longa, 3 cm. lata, chartacea, supra subnitida, glabra, subtus minute puberula praesertim ad costam nervosque, costa et nervis lateralibus utrinque conspicuis, rete venularum supra subtusque manifesto. *Panicula* terminalis, fusco-puberula, ad 18 cm. longa, ramulis patentibus ad 10 cm. longis; pedicelli 3-4 mm. longi. *Sepala* 5, in alabastro leviter imbricata, ovata, extra puberula, circiter 1.75 mm. longa, 1.5 mm. lata. *Petala* esquamata, pilosula, saepius spathulata apice emarginata, interdum integra, 1-1.5 mm. longa. *Discus* 5-lobatus, puberulus. *Stamina* 7-8, filamentis 2.5 mm. longis basin versus pilosis. *Carpella* sat dense puberula. *Fructus* globosus, circiter 12 mm. diametro, stipitatus, stipite 2-3 mm. longo, epicarpio minute squamuloso, arillo statu vivo fragrante.

Brought from N.E. Thailand and cultivated in Bangkok, *Winit*.

This plant is not uncommonly cultivated in some of the provinces of Ubon and Rachasima. It is said to have been introduced from Cambodia, but is also reported to occur wild. Only cultivated specimens have been seen. Locally it is known as *Lamyai krua*, or the climbing Lamyai (*Euphoria Longana*). The first collection of this interesting plant was sent from Bangkok by Nai Noe. His specimens had considerably smaller leaflets than any seen since, and have not been used in drawing up the description.

**Dolichos fragrans** Kerr (Leguminosae—Euphaseoleae); species *D. subcarnoso* Wight et Arn affinis, floribus fere duplo majoribus foliis deciduis differt.

*Planta* scandens; caulis lignosus, fistulosus, striatus, appresse griseo-pubescent, demum glabrescens, internodiis 6-15 cm. longis. *Folia* sub anthesi vulgo delapsa, trifoliolata, petiolo communi circiter 6.5 cm. longo striato pubescente supra canaliculato suffulta; stipulae mancae, pubescentes, valde striatae; stipellae filiformes, pubescentes, 4 mm. longae; foliola lateralia inaequilateralia, basi rotundata, apice subacuta, latere altero dimidiatim oblongo, altero dimidiatim ovato leviter trilobata, 8.5 cm. longa, 5.5 cm. lata, petiolulum 3 mm. longo; foliolulum terminale obovatum, basi rotundatum, 9.5 cm. longum, 7.5 cm. latum, a lateralibus circiter 2.5 cm. distans, omnia subcoriacea, supra parce strigosula, subtus dense fulvo-tomentosa, basi trinervia, nervis supra leviter impressis, subtus cum nervulis valde prominentibus. *Racemi* ex axillis foliorum delapsorum orti, 5-10-flori, omnino molliter pubescentes; pedunculus communis 1-6 cm. longus, robustus, leviter striatus; rhachis ad pedicellorum insertiones leviter tumida; bractee



lineari-ovatae, 6 mm. longae, cito deciduae; pedicelli 0.8-1.5 cm. longi; bracteolae binae ovatae, 4 mm. longae, 3 mm. latae, ad calycis basin affixae. *Calyx* extra intusque sericeus; tubus 6 mm. longus; lobi inter se aequilongi, triangulares, 4 mm. longi, duo postici connati. *Corolla* violacea, fragrans (ex *de Schaunensee*); vexillum obovato-rotundatum, apice emarginatum, 3.2 cm. longum, 3 cm. latum, basi auriculis binis inflexis praeditum, in unguem 4 mm. longum abrupte attenuatum, paulo supra basin bicallosum; alae oblongo-obovatae, ungui 4.5 mm. longo incluso 3 cm. longae, altero latere paulo supra basin obscure unidentatae; altero latere basi truncato-auriculatae, apice rotundatae; carinae petala leviter falcata, unguiculata, basi unilateraliter auriculata, apice rotundata, paulo supra basin plica 3 mm. longa ornata. *Stamen* vexillare a ceteris liberum, basi utrinque inaequaliter hamatum, antheris similibus. *Ovarium* lineari-oblongum, puberulum, 2.2 cm. longum, basin versus leviter attenuatum, basi ipsa disco annulari 1 mm. alto cinctum; stylus curvatus, glaber, basin versus leviter incrassatus; stigma terminale capitatum, obscure bilobatum, margine pilosum. *Legumen* juvenile lineare, 13 mm. longum, 4 mm. latum, puberulum, 10-14-spermum, apice stylo persistente coronatum.

Doi Chiangdao, c. 1610 m., steep limestone peak, anti-clockwise climber now out of leaf, flower shades of violet, *Garrett* 1167 (type); *ibid.*, 900 m., open forest, lilac flowers, *Kerr* 2854; *ibid.*, *Pui* 4480; *ibid.*, 1680 m., fragrant violet-coloured flowers, no leaves at anthesis, growing on limestone, *de Schauensee* 719708 (*Herb. Acad. Nat. Sc. Phil.*).

All the collections of this proposed species come from the limestone mountain, Doi Chiangdao, and all are without leaf except *Pui* 4480, on which a single leaf fortunately remained. From this the description of the leaf is taken.

***Erycibe fecunda* Kerr** (Convolvulaceae-Erycibeae); species e descriptione *E. elliptilimbae* Merrill affinis, infrutescentia pubescente fructu subgloboso distinguitur.

*Frutex* scandens, ramulis longitudinaliter rugosis glabris. *Folia* late elliptica, basi late cuneata vel rotundata, apice breviter obtuseque acuminata, 10.5-13.2 cm. longa, 6.0-9.7 cm. lata, coriacea, glabra, supra subnitida, sub lente minute puncticulata, subtus pallidiora minute puncticulata et foveolata, costa supra impressa subtus prominente, nervis lateralibus 4-5 paribus angulo 30° e costa ascendentibus leviter curvatis supra impressis subtus prominulis, reticulo supra obscure impresso subtus haud manifesto; petiolus 2-3 cm. longus, rugosus, interdum leviter puberulus, supra anguste canaliculatus. *Flores* non visi. *Infrutescentia* paniculata, axillaris et terminalis, ferrugineo-pubescent, ad circiter 6.5 cm. longa. *Calyx* fructifer extra pubescens, lobis suborbicularibus 3 mm. diametro. *Fructus* subglobosus siccitate nigro-brunneus,

minute verrucosus, circiter 10 mm. diametro, apice areola leviter depressa apiculum circumdante.

Nawngkai, Chaiyaburi, c. 200 m., large woody climber at edge of evergreen forest, *Kerr* 8535.

**Erycibe hololobula** *Kerr* (Convolvulaceae-Erycibeae); ab *E. magnifica* Prain foliorum margine haud revoluta floribus multo minoribus recedit.

*Frutex* scandens, ramis ramulisque teretibus, juventute fulvo-pubescentibus mox glabrescentibus. *Folia* oblongo-oblancoolata vel oblongo-elliptica, basi sensim cuneata, apice abrupte et breviter obtuse acuminata, ad 22.5 cm. longa et 9.5 cm. lata, subcoriacea, supra juventute fulvo-pubescentia, cito glabrescentia, nigro-brunnea, subtus ubique sat dense breviterque fulvo-pubescentia, costa supra leviter impressa subtus prominente, nervis lateralibus 9-11 paribus subparallelis intra marginem arcuato-anastomosantibus supra inconspicuis subtus prominulis, nervulis supra obscuris subtus subconspicuis; petiolus crassus, rugosus, pubescens, 8-10 mm. longus. *Cymae* glomeratae, subsessiles, pubescentes, in axillis foliorum vel in nodis defoliatis dispositae, 0.8-1.5 cm. longae. *Flores* subsessiles vel pedicellis ad 1.5 mm. longis suffulti. *Sepala* subaequalia, suborbiculata, extra dense pubescentia, circiter 2.5 mm. diametro. *Corollae* tubus circiter 4 mm. longus, extra adpresse pubescens; limbus extra inter lobulos pubescens, aliter glaber; lobuli subrhomboidei, integri, circiter 3 mm. longi et 2.5 mm. lati. *Antherae* circiter 2 mm. longae; filamenta triangularia, circiter 0.3 mm. longa. *Ovarium* dense pubescens; stigma conoideum, irregulariter sulcatum. *Fructus* immaturus ovoideus, apiculatus, sat dense breviterque brunneo-pubescens, calycis lobis patentibus haud adpressis.

Ranawng, Kraburi, in scrub, flowers pale yellow, *Kerr* 16371.

**Erycibe Noei** *Kerr* (Convolvulaceae-Erycibeae); species *E. Rabilii* *Kerr* affinis, sed foliis pro rata angustioribus, inflorescentia laxiore differt; necnon *E. elliptilimbae* *Merrill* affinis, a qua ramulis haud glabris foliis minoribus distinguenda.

*Frutex* scandens; ramuli pilis adpressis praesertim ad nodos sparse obsiti et plicis exilibus longitudinaliter notati. *Folia* elliptica vel oblongo-elliptica, basi rotundata vel late cuneata, apice breviter obtuseque acuminata, 8.4 cm. longa, 3.2 cm. lata, usque ad 11.5 cm. longa, 4 cm. lata, coriacea, glabra, vel interdum subtus pilis longis adpressis secus costam obsita, supra subnitida, subtus olivacea, minute puncticulata et foveolata, costa supra impressa subtus prominula, nervis lateralibus 5-7 paribus supra subtusque leviter impressis sed haud conspicuis, sub lente reticulo leviter impresso; petiolus 6-8 mm. longus, adpresse pubescens, longitudinaliter rugosus, supra canaliculatus. *Inflorescentia* terminalis et axillaris, racemiformis, e cymulis 2-5-floris composita,

ferrugineo-pubescent, pedunculo communi 8-18 mm. longo suffulta, cymulis breviter pedunculatis, tota ad 4.8 cm. longa. *Flores* pedicellati, pedicellis circiter 3 mm. longis. *Calyx* extra dense pubescens; sepala subaequalia, suborbiculata, circiter 2.5 mm. diametro. *Corollae* tubus circiter 2.5 mm. longus, glaber nisi extra superne pubescens; loborum pars inter lobulos extra dense adpresse tomentosa, intus cum lobulis glabra; lobuli subrotundati, margine inciso-serrati, circiter 2.5 mm. longi et lati. *Stamina* tubi basin versus affixa; antherae breviter acuminatae, 1.5 mm. longae; filamenta circiter 1.2 mm. longa, inferne leviter expansa, ad basin utrinque dente minuto praedita. *Ovarium* glabrum, circiter 2 mm. altum. *Fructus* ignotus.

Korat, Ban Chum Seng, flowers scented, *Noe* 210.

**Erycibe Rabilii** Kerr (Convolvulaceae-Erycibeae); species e descriptione *E. elliptilimbae* Merrill affinis, sed foliis pro rata latioribus, inflorescentia pubescente distinguenda.

*Frutex* scandens; ramuli primo angulares, mox plicis tenuibus longitudinaliter notati, glabri. *Folia* oblongo-ovata vel oblongo-elliptica, basi rotundata, apice breviter et obtuse acuminata, 8.2-15.7 cm. longa, 4.6-7.8 cm. lata, coriacea, glabra, subtus minute puncticulata et minute irregulariterque foveolata, costa supra impressa subtus prominente, nervis lateralibus saepius 5 paribus, angulo 50° e costa ascendentibus supra impressis subtus prominulis, reticulo supra subtusque leviter impresso; petiolus 1.5-1.9 cm. longus, longitudinaliter rugosus, supra anguste canaliculatus. *Inflorescentia* axillaris et terminalis, ad 5 cm. longa, conferte multiflora, ferrugineo-pubescent, subsessilis vel pedunculata, pedunculo ad 1.2 cm. longo. *Flores* pedicellati, pedicellis circiter 2 mm. longis. *Calyx* extra dense ferrugineo-pubescent; lobi subaequales, suborbiculares, circiter 2.5 mm. diametro. *Corollae* tubus 4 mm. longus; lobi 6 mm. longi, extra inter lobulos dense adpresse pubescentes, aliter glabri; lobuli siccitate nigrescentes, subrhomboidei, margine inciso-serrati, 5 mm. lati. *Stamina* tubi basin versus affixa; antherae acuminatae, 1.8 mm. longae; filamenta inferne leviter expansa, 1.8 mm. longa. *Ovarium* glabrum, circiter 2 mm. altum. *Fructus* non visus.

Tungsong, Kao Namnom Keo, flowers yellow, very fragrant, *Rabil* 225.

*Erycibe secunda*, *E. Noei*, *E. Rabilii* and probably *E. elliptilimba* Merrill form a group of closely allied species, differing considerably, however, in the size, shape and venation of their leaves.

### **Lettsomia** Roxb.

Roxburgh's genus *Lettsomia*, first fully published in 1824 (Roxb. Fl. Ind., ed. Carey et Wall, 2, 75), is antedated by *Lettsomia* Ruiz et Pav. (Prodr. 77, t. 14—1794), a genus of Theaceae, against which *Freziera* Sw. has been conserved. *Lettsomia* Roxb. is, it is

understood, to be put forward for conservation at the next Congress. In the expectation that this will be allowed, Roxburgh's name is retained here.

**Lettsomia brachypoda** Kerr (Convolvulaceae-Argyreieae); species *L. bellae* C. B. Clarke affinis, sed foliis pro rata latoribus, foliorum indumento diverso, antheris vix exsertis recedit.

*Suffrutex*, habitu ignoto; caulis sat robustus, teres, lignosus, dense et breviter lanato-tomentosus, tomento cinereo vel pallide brunneo. *Folia* late ovata, suborbicularia vel fere reniformia, basi leviter cordata, apice rotundata, saepius emarginata, 3 cm. longa, 4 cm. lata ad 7 cm. longa, 8.2 cm. lata, caulis apicem versus saepius minora, supra viridi-brunnea, subtus sordide crenea, pagina superiore dense et adpresse sericeo-villosa, pagina inferiore densissime lanosa, costa cum nervis lateralibus supra valde impressa, subtus valde prominente, nervis transversis supra obscuris subtus prominulis; petiolus longitudine variabilis, 1.5-4.6 cm. longus, indumento ejus caulis simili vestitus, supra sulcatus. *Inflorescentiae* axillares, plerumque caulis summitatem versus dispositae, subcapitatae, pluriflorae, dense lanato-tomentosae; pedunculi vulgo petiolis multo breviores, robusti, 0.8-2.5 cm. longi; bracteae forma variabiles, quattuor exteriores calyces superantes, late obovatae, obtusae, circiter 11 mm. longae, 14 mm. latae, demum deciduae, interiores ellipticae, acutae vel subacutae, circiter 11 mm. longae, 5 mm. latae, indumento eo bractearum exteriorum longiore et patentiore vestitae. *Flores* sessiles. *Sepala* inaequalia, extra longe et dense sericeo-tomentosa, intus glabra; duo exteriora late elliptica, subacuta, circiter 8 mm. longa, 5 mm. lata; tria interiora linearia vel lineari-elliptica, circiter 4.5 mm. longa, 1.5 mm. lata. *Corolla* infundibuliformis, circiter 17 mm. longa; tubus 12 mm. longus, extra glaber, intus ad insertionem staminum papillosus; lobi oblongi, apice leviter emarginati, circiter 5.5 mm. longi, extra dense et longe albido-pilosi. *Stamina* 6 mm. supra basin tubi inserta; antherae 2.5 mm. longae; filamenta 7 mm. longa, basi triangulariter dilatata et papillosa, ceterum glabra. *Discus* 0.7 mm. altus. *Ovarium* 1.5 mm. altum, glabrum. *Fructus* subsuccosus, globosus, rufescens, circiter 5 mm. diametro.

Korat, Hui Taleng, *Put* 2190.

**Lettsomia breviscapa** Kerr (Convolvulaceae-Argyreieae); *L. longifoliae* Coll. et Hemsl., ut videtur, proxime affinis, foliis et bracteis latoribus petiolis brevioribus differt.

*Planta* volubilis; caulis teres, leviter striatus, adpresse pubescens, internodiis 5-11 cm. longis. *Folia* oblonga vel oblongo-elliptica, basi longe et acute cuneata, apice rotundata, emarginata, margine obscure undulata, ad 11.7 cm. longa, 3.8 cm. lata, papyracea, supra pilis brevibus basi bulbosis strigosa, subtus pilis similibus

paucioribus pubescentia molliore intermixta vestita, supra costa cum nervis lateralibus plana vel leviter prominula, subtus prominente, nervis lateralibus 8-10 paribus fere rectis nisi marginem versus valde arcuatis; petiolus gracilis, 1.7-2.5 cm. longus, pubescens. *Inflorescentia* axillaris, conferte cymosa, pluriflora, foliis multo brevior; pedunculus 0.5-1.2 cm. longus; bractee exteriores foliosae, sessiles, ovatae, ad 3.8 cm. longae, 3.5 cm. latae, indumento ejus foliorum simili vestitae; bractee interiores sensim minores. *Flores* sessiles vel subsessiles, singillatim florentes. *Sepala* subaequalia, lanceolata, acute acuminata, glabra, vel pilis paucis adpressis basi et apice induta, circiter 14 mm. longa et 5.5 mm. lata. *Corolla* subcampanulata, alba (ex *Put*), circiter 5 cm. longa, extra intusque glabra. *Stamina* aequalia, 6 mm. supra basin tubi inserta, inclusa; antherae circiter 5.5 mm. longae; filamenta 15 mm. longa, glabra, leviter complanata, basi triangulariter dilatata. *Discus* margine obscure undulatus, circiter 1 mm. altus. *Ovarium* glabrum, circiter 2.5 mm. altum; stylus 22 mm. longus. *Fructus* ignotus.

Nakawn Sawan, Hua Wai, *Put* 4045.

***Lettsomia calcicola* Kerr** (Convolvulaceae-Argyreieae); species *L. sphaerocephalae* Prain affinis, foliis minoribus, pedunculis multo minoribus, inter alia, differt.

*Planta* procumbens; caulis teres, gracilis, pubescens, internodiis vulgo 4.5-7 cm. longis. *Folia* oblongo-ovata vel oblongo-lanceolata, basi rotundata interdum obscure cordata, apice subacuta vel obtusa, minute mucronata, 3.8 cm. longa, 1.3 cm. lata ad 5.4 cm. longa, 1.7 cm. lata, subcoriacea, supra siccitate viridi-brunnea, subtus pallidiora, cineracea, supra scabro-strigosa, subtus dense adpresse hirsuta, costa supra impressa subtus prominula, nervis lateralibus 6-7 paribus supra obscuris subtus leviter prominulis fere rectis marginem versus evanescentibus; petiolus 0.6-1 cm. longus, strigoso-pubescens. *Inflorescentia* axillaris, subcapitata, pluriflora, breviter pedunculata; pedunculus petiolo aequilongus vel brevior, indumento ejus caulis simili vestitus; bractee exteriores sessiles, ovatae, ad 25 mm. longae, 20 mm. latae, extra dense adpresse pubescentes, bractee interiores sensim decrescentes et tenuius pubescentes. *Flores* sessiles vel subsessiles, singillatim florentes. *Sepala* subaequalia, oblongo-ovata, acute acuminata, glabra nisi ad acumen pilis paucis adpressis induta. *Corolla* subcampanulata, alba, circiter 3.5 cm. longa, extra ad loborum apicem parcissime hirsuta aliter glabra. *Stamina* 5 mm. supra basin tubi inserta, inclusa; antherae circiter 4 mm. longae; filamenta 14 mm. longa, basin versus breviter dilatata et minute papillosa, aliter glabra. *Discus* circiter 1.3 mm. altus, margine undulatus, ovarium aequans. *Ovarium* glabrum; stylus 21 mm. longus. *Fructus* ignotus.

Kanburi, Kao Tawng, c. 100 m., trailing on ground in open deciduous forest on rocky limestone hill, *Kerr* 19658.

**Lettsomia Collinsae** (Craib) Kerr, comb. nov. *Rivea Collinsae* Craib in Kew Bull. 1916, 266.

The material now available shows that this plant is a *Lettsomia* rather than a *Rivea*.

**Lettsomia ionantha** Kerr (Convolvulaceae-Argyreieae); a *L. strigosa* Roxb., cui affinis, indumento brevior pilis longis patentibus deficientibus, inflorescentia laxiore bracteis longioribus augustioribus distinguenda.

*Planta* volubilis; caulis teres vel leviter complanatus, sat dense adpresse fusco-pubescens, internodiis vulgo circiter 20 cm. longis. *Folia* lata ovata, valde cordata, sinu late aperto auriculis rotundatis, apice breviter acuteque acuminata, margine obsolete undulata, ad 13.7 cm. longa, 12.5 cm. lata, supra pilis brevibus basi bulbosis adpresse hirsuta, subtus molliter adpresse pubescentia, costa supra prominula subtus prominente, nervis lateralibus 8-9 paribus supra prominulis subtus prominentibus marginem versus valde arcuatis; petiolus 5-9 cm. longus, indumento caulis indutus. *Inflorescentia* axillaris, capitato-cymosa, circiter 3-6-flora, fusco-pubescens, folia saepius excedens; pedunculus gracilis, 8-16 cm. longus; bractee exteriores anguste lanceolatae, ad 27 mm. longae et 8.5 mm. latae, interiores minores et pro rata angustiores, saepe lineares. *Flores* subsessiles. *Sepala* ovata, acuta, extra longe hirsuta, inaequalia, exteriora 12 mm. longa, 4.5 mm. lata, interiora 9 mm. longa, 3 mm. lata. *Corolla* campanulata, violacea (ex Garrett), 5 cm. longa, extra longe hirsuta, intus glabra. *Stamina* inclusa, parum inaequalia, 6 mm. supra basin tubi inserta; antherae lineares, minute apiculatae, 5 mm. longae; filamenta 15-20 mm. longa, parte basali circiter 7 mm. longa sensim dilatata et pilis brevibus brunneo-capitatis vestita. *Discus* annulatus, margine undulatus, circiter 1 mm. altus. *Ovarium* glabrum, 2 mm. altum; stylus 30 mm. longus. *Fructus* non visus.

Doi Pa Kao, south-west slope, circiter 1550 m., Garrett 738.

**Lettsomia roseopurpurea** Kerr (Convolvulaceae-Argyreieae); species ex affinitate *L. Kunstleri* Prain, indumento tenuiore pedunculis brevioribus distinguitur.

*Suffrutex* volubilis; ramuli subteretes vel parum angulati, pilis fulvis erectis adpressis parce hirsuti. *Folia* ovata, basi leviter cordata vel rotundata, apice obtusa, apiculata, margine integra, plana, 6.2 cm. longa, 4.7 cm. lata ad 13.3 cm. longa, 10 cm. lata, subcoriacea, siccitate supra brunneo-viridia, subtus multo pallidiora, griseo-brunnea, supra minute et crebre papillata, juventute parce hirsuta densius ad costam, costa excepta cito glabrescentia, subtus secus costam nervos et marginem sat dense ceterum parce adpresse fulvo-hirsuta, costa supra impressa subtus prominente, nervis lateralibus 6-9 paribus procurvis ascendentibus prope marginem

anastomosantibus, supra tenuiter elevatis subtus prominentibus, nervis transversis subtus prominulis irregulariter scalariformiter dispositis; petiolus supra anguste sulcatus, adpresse hirsutus, 1.5-7.5 cm. longus. *Inflorescentia* axillaris, cymosa, pedunculata, omnino adpresse fulvo-hirsuta, saepius foliis parum brevior; pedunculus 4-8 cm. longus; rami breves, 0.4-0.9 cm. longi; bracteae ovatae, circiter 2 mm. longae, cito deciduae; pedicelli 0-4 mm. longi. *Sepala* extima late lanceolata, obtusa, extra dense fulvo-hirsuta, intus glabra, 4 mm. longa, 3.5 mm. lata, intima late ovata, extra medio dorso hirsuta margine glabra, 4 mm. longa, 5 mm. lata. *Corolla* infundibuliformis, breviter 5-lobata, limbo roseo ad faucem purpureo, extra pilis longis fulvis secus petalorum dorsum hirsuta, intus glabra, circiter 2.5 cm. longa. *Stamina* subaequalia, inclusa, 4 mm. supra basin tubi inserta; antherae oblongae, hastatae, 3.5 mm. longae; filamenta glabra, basin versus leviter dilatata, 11 mm. longa. *Discus* leviter 5-lobatus, circiter 1.2 mm. altus. *Ovarium* glabrum, circiter 2 mm. altum, in stylum sensim attenuatum; stylus 15 mm. longus, glaber; stigma biglobosum. *Fructus* ignotus.

Chumpawn, Kao Tong, circiter 700 m., woody climber in ever-green forest, flowers pink with purple centre, *Kerr* 11531.

***Lettsomia stenophylla* Kerr** (Convolvulaceae-Argyreieae); species inter congeneros ob folia linearia, inflorescentiam brevipedunculatam paucifloram facile distinguenda.

*Planta* repens. *Radix* lignoso-tuberosa, fusiformis. *Caulis* sat gracilis, strigosus, internodiis foliis vulgo brevioribus. *Folia* anguste linearia, basi rotundata, apice obtusa minute mucronata, 45-60 mm. longa, 3.5-5 mm. lata, supra glabra nisi secus costam et ad marginem strigosa, subtus strigosa, costa pagina utraque prominula, nervis lateralibus obscuris; petiolus strigosus, 3-7 mm. longus. *Inflorescentia* axillaris, strigosa, saepius uniflora, raro biflora; pedunculus ad 3 mm. longus; pedicellus basi bracteolis binis ovatis circiter 6 mm. longis, 2 mm. latis praeditus, 4-5 mm. longus. *Sepala* subaequalia, ovata, acuta, circiter 8 mm. longa, 3 mm. lata, in fructu accrescentia, extra dense strigosa, intus glabra. *Corolla* anguste campanulato-infundibularis, extra sat dense strigosa, 4.3 cm. longa; limbus obscure lobatus, purpureus; tubus albus, intus ad staminum insertionem pilorum rigidiusculorum erectorum cingulo praeditus. *Stamina* parum inaequalia, inclusa, 3 mm. supra basin tubi inserta; filamenta 5-8 mm. longa, basi triangulariter dilatata et dense papilloso-pilosa; antherae circiter 5 mm. longae. *Discus* anguste cupularis, margine leviter sinuatus, circiter 0.5 mm. altus. *Ovarium* glabrum, 2 mm. altum, in stylum sensim attenuatum, biloculare, seminibus duobus in quoque loculo. *Fructus* vix maturus, globosus, circiter 7 mm. diametro, ut videtur monospermus et indehiscens, pedicello incrassato suffultus; semina ovoidea, glabra, minute reticulata, circiter 5 mm. longa.

Chiengmai, Me Teng, circiter 700 m., trailing on ground in open grassy forest, *Kerr* 6490.

In habit this plant bears a strong resemblance to *Ipomoea popahensis* Coll. et Hemsl., which may also prove to be a *Lettsomia*, differing chiefly in its broader non-acuminate sepals.

**Lettsomia versicolor** *Kerr* (Convolvulaceae-Argyreieae); *L. Maingayi* C. B. Clarke affinis, foliis cordatis haud glabrescentibus, inflorescentia laxiore distinguitur.

*Suffrutex* volubilis; caulis teres, striatus, pubescens, internodiis vulgo 2.5-5 cm. longis. *Folia* ovata, basi cordata, apice sat subito et acute acuminata, 5.6 cm. longa, 3.7 cm. lata ad 7.6 cm. longa, 4.7 cm. lata, papyracea, supra scabro-strigosa, subtus dense adpresse hirsuta, costa cum nervis lateralibus supra leviter prominula subtus prominente, nervis lateralibus 8-9 paribus patulis marginem versus arcuatis; petiolus sat robustus, pubescens, 1-1.3 cm. longus. *Inflorescentia* axillaris, conferte cymosa, pluriflora, pubescens; pedunculus robustus, 1-1.7 cm. longus, ramulis 0.5-0.8 cm. longis; bracteae exteriores oblanceolatae, acute acuminatae, extra pubescens, circiter 3.5 cm. longae, 1.4 cm. latae, interiores angustiores aliter similes; pedicelli circiter 3-4 mm. longi. *Sepala* subaequalia, elliptica, apice rotundata, circiter 12 mm. longa, 9 mm. lata, exteriora extra sparse adpresse hirsuta, interiora glabra. *Corolla* subtubiformis, medio sensim dilatata, apicem versus parum contracta, 5 cm. longa, extra parte superiore sparse hirsuta; tubus albus, limbus purpureo-maculatus. *Stamina* 8 mm. supra basin tubi inserta, inclusa; antherae 5 mm. longae; filamenta parum inaequalia, circiter 18 mm. longa, basi triangulariter dilatata, apice partis dilatatae glandulifera aliter glabra. *Discus* circiter 0.7 mm. altus, margine vix undulatus. *Ovarium* 2 mm. altum. *Fructus* ignotus.

Krabin, Wattana, circiter 100 m., climbing on bushes in scrub, *Kerr* 9786.

**Ipomoea hylophila** *Kerr* (Convolvulaceae-Ipomoeae); species *I. nanae* Coll. et Hemsl. affinis, indumento diverso, corolla extra glabra, staminibus aequalibus distinguitur.

*Suffrutex* scandens; caulis ad circiter 2 mm. diametro, inferne lignosus, teres, striatus, juventute breviter pubescens pilis paucis strigosis intermixtis, internodiis 2-6 cm. longis. *Folia* oblonga vel oblongo-oblanceolata, basi rotundata vel late cuneata, apice rotundata vel abrupte et breviter acuminata, 3.5 cm. longa, 1.3 cm. lata, ad 6.8 cm. longa, 3.2 cm. lata, papyracea, supra sparse breviterque pilosa praecipue ad costam nervosque, subtus pilis adpressis hirsutiora, costa nervisque supra prominulis subtus prominentibus, nervis lateralibus 7-9 paribus fere rectis subparallelis ad marginem arcuatis et anastomosantibus; petiolus gracilis, pubescens, 0.6-2 cm. longus. *Inflorescentia* axillaris, 1-3-flora, foliis brevior,



sessilis vel breviter pedunculata; pedunculus ad 3 mm. longus, pubescens; bractee lineares, pubescentes, ad 4 mm. longae; pedicelli pubescentes, striati, superne incrassati, circiter 5 mm. longi. *Sepala* parum inaequalia, extra intusque pubescentia; exteriora lanceolata, obtusa, circiter 13 mm. longa, 6 mm. lata; interiora ovata, subacuta, circiter 11 mm. longa, 6 mm. lata; statu frutescente omnia accrescentia et patentia. *Corolla* purpurea, tubulo-campanulata, circiter 5 cm. longa, limbo leviter 5-lobato, extra intusque glabra. *Stamina* aequalia, 5 mm. supra basin corollae inserta; filamenta 15 mm. longa, basi dilatata et parce pilosa; antherae oblongae, minute apiculatae, 3.5 mm. longae. *Discus* annularis, circiter 1 mm. altus. *Ovarium* conicum, glabrum, circiter 2.5 mm. altum; stylus filiformis, 23 mm. longus, glaber. *Fructus* immaturus globosus, 6 mm. diametro.

Raheng, Ban Pa Yang, c. 100 m., climbing on undergrowth in deciduous forest, *Kerr* 4579.

When mature fruit is known, it is possible that this species, probably also *I. nana*, may have to be transferred to *Lettsonia*. Both species have rather the facies of that genus.

***Ipomoea soluta* Kerr nom. nov.**—*I. campanulata* C. B. Clarke in Fl. Brit. Ind. 4, 211, excl. var. *illustris* C. B. Clarke, et auct. al., non Linn. Sp. Pl. 160 (1753).

This species has long borne an untenable name, *Ipomoea campanulata*. Under that name Linnaeus described what was evidently not a convolvulaceous plant. Moreover, as Hallier f. in Meded. Rijksherb. Leiden 1. 26 has pointed out, the specimen in the Linnean Herbarium named *Ipomoea campanulata* is *Thespesia populnea* (Linn.) Soland., to which the Linnean description of *I. campanulata* more nearly applies. *Ipomoea campanulata* must therefore, as stated by van Ooststroom (*Blumea* 3, 568), be treated as a synonym of *Thespesia populnea*. In perpetuating the Linnean name most authors have relied on the citation of Adamboe, Rheede Hort. Mal. 11, t. 56, which is probably *Stictocardia tiliaefolia* (Desr.) Hall. f., and which bears some resemblance to our plant. C. B. Clarke in Flor. Brit. Ind. 4, 211 used the name *I. campanulata* for our species, but he made a variety of it, *illustris*, for a larger-flowered more glabrous plant. Prain, in Bengal Plants 2, 735, separated the variety *illustris* as a distinct species, confined to the sea-shore; but he did not propose any change of name for the inland plant, with which we are concerned. None of the synonyms usually given under *I. campanulata* applies solely to this inland plant, which must, therefore, be given a new name. It is suggested that a sheet from Herb. Dalzell, from Bombay, in Herb. Kew, be regarded as the type of *I. soluta*.

***Merremia bambusetorum* Kerr** (Convolvulaceae-Convolvuleae); species prope *M. umbellatam* (Linn.) Hall. f. forsan ponenda, a qua

inflorescentia pauciflora longius pedunculata, floribus majoribus distinguenda.

*Planta* volubilis; caulis teres, gracilis, tenuiter striatus, glaber, siccitate nigro-brunneus, internodiis 4-11 cm. longis. *Folia* oblongo-elliptica vel oblongo-oblancheolata, apice acuminata, mucronulata, basi plus minusve cordata, auriculis interdum obscure dentatis, 5.5 cm. longa, 1.7 cm. lata, ad 11 cm. longa, 3 cm. lata, membranacea, siccitate supra nigro-brunnea, subtus pallidiora, glabra nisi supra secundum costam minute puberula, costa supra impressa subtus prominula, nervis lateralibus 7-9 paribus supra subplanis subtus prominulis, nervis transversis subparallelis cum rete venularum subtus conspicuis; petiolus tenuis, supra anguste sulcatus et minute puberulus, 0.8-1.2 cm. longus. *Inflorescentia* axillaris, plerumque uniflora, interdum biflora, glabra; pedunculus 3-4.5 cm. longus, petiolo multo crassior; bracteae ovatae, circiter 0.75 mm. longae; pedicelli minute verrucosi, superne incrassati, 1-1.6 cm. longi. *Sepala* subaequalia, concava, glabra; exteriora obovata, obtusa, breviter apiculata, 12 mm. longa, 8 mm. lata; interiora late elliptica, apice leviter emarginata et mucronulata, margine membranacea, 12 mm. longa et 9 mm. lata. *Corolla* infundibuliformis, pallide lutea, circiter 3.5 cm. longa, extra superne parce pilosa, intus infra staminum insertionem lineis papillois notata, vittis 5 mesopetalinis manifestis sed haud nigrescentibus. *Stamina* 5 mm. supra basin corollae inserta; filamenta parum inaequalia, 8-10.5 mm. longa, paulo complanata, basin versus leviter et sensim dilatata et parce papillosa; antherae 4 mm. longae, rectae; pollen ellipsoideum, laeve. *Discus* circiter 1 mm. altus, leviter sinuatus. *Ovarium* conicum, glabrum, 2 mm. altum; stylus glaber, 16 mm. longus. *Fructus* ignotus.

Krat, Kao Kuap, c. 400 m., climbing in bamboo forest, *Kerr* 17704.

In the absence of fruit this plant is referred to *Merremia*, though there seems no close affinity for it within that genus. Possibly it may belong rather to *Operculina*; but a decision on this point must await the receipt of mature fruit. A collection, *Hancock* 39, from Mengtsze, Yunnan, is also referable to this species.

**Porana bialata** *Kerr* (Convolvulaceae-Poraneae); species *P. sinensi* Hemsl. affinis, floribus dimidio minoribus distinguenda.

*Planta* volubilis; caulis teres, herbaceus, pubescens, demum glabrescens. *Folia* ovata, basi leviter cordata, ima basi breviter cuneata, apice parum acuminata, acuta, mucronulata, auriculis rotundatis, 5.4 cm. longa, 3.8 cm. lata ad 8 cm. longa, 5.8 cm. lata, papyracea, supra minute puberula praecipue ad nervos, subtus densius puberula, basi palmatim 5-nervia, subtus sub lente rete venularum manifesto; petiolus teres, gracilis, puberulus, 1.5-3.5 cm. longus. *Inflorescentia* axillaris, racemiformis, vel rami apicem versus paniculatim disposita et bracteis foliosis praedita, ad 26 cm.

longa, pubescens ; bracteae inferiores interdum foliosae, superiores lineares, omnes cito deciduae ; pedicelli graciles, 3-8 mm. longi ; bracteolae 3, lanceolatae, acutae, 3-nerviae, 3-4 mm. longae, sepala simulantes et in epicalycis forma dispositae. *Sepala* valde inaequalia ; duo exteriora ovata, longe obtuseque acuminata, circiter 3.7 mm. longa, basin versus 1.5 mm. lata, extra puberula ; tria interiora multo minora, ovata, breviter et acute acuminata, glabra, 1.5 mm. longa, 1 mm. lata, sub anthesi intra sepala exteriora et bracteolas penitus occulta. *Corolla* infundibuliformis, circiter 10-12 mm. longa, subintegra, extra parce et minute puberula, intus glabra. *Stamina* inaequalia, 1 mm. supra basin corollae inserta, glabra ; filamenta 2.5-4.5 mm. longa, basin versus vix dilatata ; antherae circiter 1.5 mm. longae. *Discus* haud manifestus. *Ovarium* ovoideum, glabrum, circiter 0.7 mm. altum, ut videtur uniloculare, biovulatum ; stylus glaber, 6 mm. longus ; stigma integrum globosum. *Fructus* maturus sepalis scariosis accrescentibus valde inaequalibus circumcinctus, oblongus, glaber, circiter 7 mm. altus, 3 mm. crassus, apice stylo sicco coronatus ; sepala 2 exteriora valde elongata, oblonga, circiter 5 cm. longa et 1 cm. lata, basi contracta et contorta, apice rotundata, extra secus nervos minute et parce puberula, nervis 5 parallelibus utrinque elevatis inter se nervis transversis scalariformiter connexis longitudinaliter percursa ; 3 interiora oblanceolata, acuta, circiter 8.5 mm. longa, 4 mm. lata ; bracteolae etiam scariosae, vix auctae, 4-5 mm. longae, 1 mm. latae ; semen unicum, cotyledonibus valde plicatis.

Petchaburi, Me Prachan, climber with white flowers in scrub, *Winit* 406 ; Prachuap, Hui Yang, *Put* 3166 (type) ; Prachuap, Kan Kradai, *Put* 2326.

*Winit* 406 differs from the type in that the inner sepals have a few hairs on the outside near the tip, and the base of the corolla tube within, as well as the base of the filaments, is minutely and scantily papulose-puberulent. The description of the fruit has been drawn up from *Put* 2326.

***Porana sutepensis* Kerr** (Convolvulaceae-Poraneae) ; species *P. spectabili* Kurz affinis, foliis altius cordatis subtus canescentibus haud fulvo-tomentosis, calycis lobis fructiferis multo majoribus differt.

*Planta* volubilis, lignosa ; ramuli robusti, teretes, pubescentes, cortice leviter longitudinaliter plicato obtecti. *Folia* ovata, basi cordata sinu patulo lobis rotundatis, apice sat subito acute et anguste acuminata, 10 cm. longa, 7.3 cm. lata, ad 17 cm. longa, 13 cm. lata, chartacea, siccitate supra nigro-brunnea, subtus canescentia, supra minute puberula vel fere glabrescentia, subtus dense albido-tomentosa, nervis e basi 5, supra leviter impressis subtus prominentibus, nervis transversis subparallelis supra obscuris subtus prominulis ; petiolus sat robustus, tomentosus, 4-7 cm. longus. *Flores* non visi. *Infrutescentia* axillaris, racemiformis,

puberula, 12-38 cm. longa ; pedunculus communis 9-15 cm. longus ; pedicelli 1-1.5 cm. longi. *Fructus* maturus sepalis scariosis accrescentibus circumcinctus, oblongo-obovoideus, pilis albidis erectis adpressis dense hirsutus, circiter 10 mm. altus, apice stylo sicco hirsuto coronatus ; sepala 3 exteriora oblongo-lanceolata, apice subacuta, parum inaequalia, 5.5 cm. longa, 1.1 cm. lata, ad 7.5 cm. longa, 1.6 cm. lata, utrinque puberula, nervis 5 inter se nervis transversis scalariformiter connexis longitudinaliter percursa ; 2 interiora lanceolata, 2.5 cm. longa, 0.4 cm. lata, apice longe sensimque attenuata ; bracteolae scariosae, lineares, acutae, circiter 10 mm. longae ; semen unicum, ovoideum, circiter 10 mm. longum, purpureo-brunneum, valde rugosum et minute foveolatum.

Doi Sutep, 900 m., evergreen forest, *Kerr* 2605.

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We append the description of a new species of *Paraboea* collected by Mr. H. B. Garrett.

***Paraboea glabrisepala*** *B. L. Burt*, sp. nov. ; affinis *P. capitatae* Ridley sed bracteis majoribus glabris et sepalis glabris emarginatis valde distincta.

*Herba* caule brevi crasso 5 cm. longo dense foliato. *Petiolus* usque 16 cm. longus, pannoso-tomentosus, ima basi vaginatim dilatatus. *Lamina* oblonga, usque 15 cm. longa et 8.5 cm. lata, apice subrotundata, basi leviter cordata, margine crebre crenata, supra primum arachnoideo-tomentosa mox glabrata, subtus dense pannoso-tomentosa ; nervi laterales utrinsecus 7, ut costa supra impressi, subtus prominentes, nervis secundariis etiam conspicuis subtus prominulis. *Inflorescentiae* axillares, pedunculo communi nudo usque 28 cm. longo tenuiter piloso vel glabrescente. *Bractee* magnae, circiter 1.5 cm. longae et 1 cm. latae, plus minusve obovatae, tenues, glabrae, flores immaturos obtegentes. *Pedicelli* usque 1.5 cm. longi, sparse papilloso-muriculati. *Sepala* 5, ad basin libera, ovato-oblonga, 1.5 mm. longa et 1.25 mm. lata, apice obtusa emarginata, glabra, trinervia et inter nervos lineis duabus brunneis notata. *Corolla* ventricosa, tubo c. 1 cm. longo, lobis 5 (in vivo reflexis ?) 3 mm. longis rotundatis. *Stamina fertilia* duo, 1 mm. supra corollae basin inserta ; filamenta circiter 6 mm. longa, dimidio superiore contorta scabro-papillosa, infra glabra ; antherae plus minusve late reniformes, 1.5 mm. longae, 5 mm. latae, glabrae, inter se leviter cohaerentes. *Staminodia* 3, 2 mm. longa ; lateralia 2 mm., dorsale 0.75 mm. supra corollae basin inserta. *Ovarium* glabrum, cylindricum, 6 mm. longum, in stylum 3 mm. longum attenuatum ; stigma leviter et inaequaliter bifidum, papillosum.

THAILAND. Doi Chiangdao, steep slope above Ban Tam, on limestone rock, c. 600 m., flowers violet, 28th Aug. 1935, *Garrett* 1001.

### III.—THREE NEW GRASSES FROM MEXICO.

W. HARTLEY.

Among the extensive collections made by Mr. G. B. Hinton in Mexico, and sent to Kew for determination, were the following new grasses :—

*Zeugites sagittata* Hartley, sp. nov., a *Z. latifolia* Hemsl. pseudopetiolis longioribus, laminis basi sagittatis, ramis paniculae gracilibus basin versus espiculatis, spiculis brevioribus late ovatis, glumis brevioribus, internodiis rhachillae brevissimis distinguenda.

*Gramen* perenne, circa 1 m. altum. *Culmi* erecti, 8–10-nodes, simplices, glabri, laeves. *Foliorum vaginæ* striatae, latae, glabrae, teretes vel superne plus minusve carinatae, sublaxae, apice rotundae, inferiores acutae, elaminatae; ligulae truncatae, membranaceae, circiter 1.5 mm. longae; pseudopetiolis explanati, superne profunde canaliculati, apice dense villosi, ceterum glabri, inferiores ad 2.5 cm. longi, superiores multo breviores vel plerumque nulli; laminae oblongo-lanceolatae, acuminatae, 15–20 cm. longae, 4–6 cm. latae, inferiores basi forte sagittatae, superiores cordatae, glabrae, nervis reticulatis, marginibus scabridis. *Panicula* pyramidalis, laxa, circiter 20 cm. longa et lata; rami graciles, teretes, purpurati, basin versus espiculati, laxè ramosi, ramuli paullo spiculati, laeves; pedicelli capillares, purpurati, laeves, laterales 2–6 mm. longi. *Spiculae* late ovatae, compressae, 7–10 mm. longae, 6–7 mm. latae, internodiis rhachillae inter anthoecia ♂ brevissimis. *Glumae* inaequales; inferior late obovata, truncata, circiter 3 mm. longa et lata, 9–11-nervis, sparse pubescens, marginibus ciliatis; superior cuneata, subgibbosa, 2 mm. longa, 7–11-nervis, puberula. *Anthoecium* ♀ *unicum*: lemma subcartilagineum, circiter 9-nerve, subcomplanatum, late ovatum, obtusum, acuminatum, gibbosum, circiter 3 mm. longum, asperulum et superne sparse pubescens; palea elliptica, cartilaginea, circiter 2.5 mm. longa. *Anthoecia* ♂ 8–12, patentia; lemmata ovata, acuta, 3–4 mm. longa, herbaceo-membranacea, 5-nervia, apicem versus asperula; paleae lemmatibus breviores, membranaceae; antherae 2.5 mm. longae.

Mexico: Temascaltepec District; near the bridge at Acatitlan, Sept. 23, 1933, *Geo. B. Hinton* 4793 in Herb. Kew.

The strongly sagittate leaf-blades of this species, borne on long pseudopetioles, distinguish it from all other members of the genus, while the short, broadly ovate spikelets with closely imbricate male florets are characteristic of this and the following species.

*Zeugites Hintoni* Hartley, sp. nov.; affinis *Z. Pittieri* Hack., a qua culmis superne pubescentibus, paniculis minoribus, spiculis et glumis brevioribus, anthoeciis ♀ saepe duobus, internodiis rhachillae brevissimis differt.

*Gramen* perenne, plus metrum altum. *Culmi* erecti, circiter 6-nodes, simplices, teretes, apicem versus et infra nodos pubescentes.

*Foliorum vaginae* striatae, latae, teretes vel superne plus minusve carinatae, internodiis breviores, apice rotundae, glabrae, marginibus pubescentibus; ligulae brevissimae, breviter ciliatae; pseudopetioli carinati, circiter 5 mm. longi, dense hirsuti; laminae lanceolatae, 15–20 cm. longae, 4–5 cm. latae, inferiores breviores, nervis reticulatis, sparse pubescentes, marginibus scabridis. *Panicula* subpyramidalis, laxa, 12–15 cm. longa et lata; rami solitarii vel raro 2-nati, teretes, basin versus ramosi et spiculati, laeves; pedicelli graciles, laeves, laterales 2–6 mm. longi. *Spiculae* ovatae, compressae, 7–9 mm. longae, 3–5 mm. latae, purpuratae. *Glumae* inaequales, glabrae, nervis reticulatis; inferior orbicularis, circiter 2.5 mm. longa, conspicue 9–11-nervis; superior cuneata, subgibbosa, 2 mm. longa, circiter 9-nervis. *Anthoecia* ♀ 1 vel 2; lemma anthoecii inferi subcartilagineum, circiter 11-nerve, oblatum, gibbosum, acuminatum, apice obtusum, circiter 3 mm. longum, glabrum, vel superne asperulum; palea obovata, concava, cartilaginea, 2–2.5 mm. longa; anthoecium secundum ♀ infero simile vel lemma herbaceo-membranaceum et vix gibbosum. *Anthoecia* ♂ 8–12, imbricata, internodiis rhachillae brevissimis; lemmata anguste ovata, 3–4 mm. longa, herbaceo-membranacea, 5–7-nervia, glabra; paleae lemmatibus paullo breviores, membranaceae; antherae 2–2.5 mm. longae.

Mexico: Temascaltepec District; on a cliff at Nanchititla, Aug. 16, 1933, *Geo. B. Hinton* 4538 in Herb. Kew.

This grass is readily distinguished from all other species of *Zengites* by the occurrence of a second female floret in many of the spikelets, and also by the pubescence of the culm below the panicle and below the nodes.

***Sporobolus Hintoni* Hartley**, sp. nov.; annua; nervi culmorum infra nodos et carinae vaginarum crateriformi-tuberculati; laminae planae, marginibus serrulatis vel pilis clavatis ciliatis; rami paniculae capillares, tuberculati et sparse pilosi; spiculae 2.6–3 mm. longae, glumis inaequalibus.

*Gramen* annuum, 0.5–1 m. altum. *Culmi* erecti, 4–6-nodes, sparse ramosi, teretes, glabri sed infra nodos nervis crateriformi-tuberculatis. *Foliorum vaginae* striatae, carinatae, internodiis breviores, carinis crateriformi-tuberculatae, margines versus pilosae; ligulae ciliolatae; laminae lineares, planae, ad 12 cm. longae, 4–8 mm. latae, glabrae, marginibus serrulatis vel basin versus pilis clavatis ciliatis. *Panicula* oblonga, laxa, 20–30 cm. longa, 10–15 cm. lata; rhachis tuberculata; rami solitarii, capillares, sparse ramosi, ad 8 cm. longi, tuberculati et sparse pilosi; pedicelli capillares, glabri, laterales 2–6 mm. longi. *Spiculae* 2.6–3 mm. longae, flavescens; glumae inaequales, membranaceae, glabrae; inferior elliptica, obtusa, 1.5 mm. longa; superior elliptica, subacuta, 1-nervis, 2.4–2.8 mm. longa; lemma ellipticum, subacutum, 1-nerve, 2.6–3 mm. longum, membranaceum, glabrum; palea late elliptica,

obtusa, 2.6–3 mm. longa, membranacea, glabra; antherae circiter 2 mm. longae; caryopsis oblonga, 1.5 mm. longa.

Mexico: Temascaltepec District; Vigas, 1,080 m., Nov. 16, 1932, *Geo. B. Hinton* 2610 in Herb. Kew.

This grass shows no affinity with any of the annual species of *Sporobolus* which occur in north and central America. The inflorescence and spikelets somewhat resemble those of the perennial *S. Palmeri* but it is readily distinguished from that species by the crateriform tubercles on the culms and leaf-sheaths, the flat blades, and the very slender, pilose branches of the panicle.

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#### IV.—MALAYAN GRASSES. C. E. HUBBARD.

***Cymbopogon calcicola*** C. E. Hubbard, sp. nov.; affinis *C. flexuoso* (Nees ex Steud.) W. Wats., a quo inflorescentiis plerumque laxioribus, spatheolis longioribus, gluma inferiore spicularum fertilium elliptico-lanceolata inter carinas 2–5-nervi, aristis longioribus differt.

*Gramen* perenne, dense caespitosum, ad 1.5 m. altum; innovationes intravaginales. *Culmi* erecti, validiusculi, teretes, glabri, laeves, infra inflorescentiam simplices et 2-nodes. *Foliorum vaginae* striatae, laeves, apice auriculatae, auriculis erectis obtusis brevibus ligulae adnatis, ore plerumque breviter pubescentes, basales compressae, inferne carinatae, dorso apicem versus rotundatae, 30–50 cm. longae, basi latae, superne gradatim attenuatae, stramineae, basi inter strias villosulae, ceterum glabrae, nitentes, coriaceae, superiores teretes, internodiis breviores, nodis obscure pubescentes, ceterum glabrae; ligulae obtusae vel truncato-obtusae, ad 3 mm. longae, scariosae; laminae lineares, basi et apice longe attenuatae, apice setaceae, ad 1.3 m. longae et 1.2 cm. latae, planae vel siccitate involutae, virides, glabrae, marginibus scabridae, ceterum laeves, costa media prominente flavida. *Inflorescentia* spatheata, 40–60 cm. longa, demum laxiuscula, multiramosa; rami filiformes, multinodes, laxè divisi, circa nodos pubescentes; spatheolae anguste lanceolatae, subacutae, 2–2.3 cm. longae, brunneae, papyraceae, marginibus convolutis; pedunculi filiformes, 8–10 mm. longi, apicem versus asperuli. *Racemi* bini, ex spatheolis lateraliter exserti, primo contigui, demum divaricato-patentes, graciles, 1.5–2 cm. longi, virides; rhacheos internodia filiformia, 2.5–3 mm. longa, dense ciliata, pilis patentibus albis 0.5–1.5 mm. longis, apice minute et inaequaliter biauriculata; pedicelli omnes gracillimi, 2.5–3 mm. longi, rhacheos internodiis similes; spicularum par infimum racemi sessilis homogamum, spicularum paria cetera heterogama. *Spiculae fertiles* elliptico-lanceolatae, acutae, 4–5 mm. longae; callus obtusus, brevissimus, minute barbatus. *Glumae* subaequales, nitentes; inferior apice acute bidentata, dorso plana, scarioso-chartacea, glabra, carinis supra medium anguste alata vel marginata, inter carinas 2–5-nervis; superior navicularis, tenuiter acuta, supra medium acute carinata, carina marginata

vel angustissime alata, marginibus ciliolatis hyalinis exceptis scariosa, 1-3-nervis. *Lemma inferum* oblongum (explanatum), truncatum, 3.5-4 mm. longum, hyalinum, 2-nerve, marginibus ciliolatis. *Lemma superum* stipitiforme, bifidum, 2-3 mm. longum, lobis tenuiter subulatis hyalinis ciliolatis; arista geniculata, 10-11 mm. longa, columna 5 mm. longa torta. *Antherae* 1.8-2 mm. longae. *Spiculae pedicellatae* ♂, lanceolatae, acutae, 4 mm. longae. *Glumae* subaequales, glabrae, firme membranaceae; inferior 9-11-nervis, carinis apicem versus scaberula; superior tenuiter 3-nervis, marginibus ciliolata. *Lemma inferum* oblongum (explanatum), truncatum, 3-3.5 mm. longum, hyalinum, 2-nerve, marginibus ciliolatum.

MALAY PENINSULA: Kedah; Gunong Baling, limestone hill, c. 360 m., Jan., 1939, *Singapore Field No.* 36256 (typus); *ibid.*, near summit, very frequent, seldom flowering, May 13th, 1938, *Kiah*.

The leaves when bruised emit a strong odour like citronella oil.

Specimens of a *Cymbopogon* collected by Henderson (*Singapore Field No.* 25224), in a wet cleft of a limestone cliff at Bukit Cheras, Pahang, Malay Peninsula, probably represent a form of the above new species. They differ, however, in the lower surface of the leaf-blades being very minutely asperulous on the nerves, in the looser inflorescence, and in the pedicelled spikelets being shorter, narrower and reduced to the glumes.

*Cymbopogon calcicola* is also related to the Citronella oil grasses, *C. Nardus* (L.) Rendle and *C. Winterianus* Jowitt, both of which possess wider and awnless fertile spikelets. *C. citratus* (DC. ex Nees) Stapf, the Lemon oil grass, may be distinguished from *C. calcicola* by its narrower, longer and awnless fertile spikelets.

***Eustachys tenera*** (J. S. Presl) C. E. Hubbard, comb. nov. *Cynodon tener* J. S. Presl in C. B. Presl, Reliq. Haenk. 1, 291 (1830). *Chloris obtusifolia* Balansa in Morot, Journ. de Bot. 4, 166 (1890). *C. tenera* (J. S. Presl) Scribn. in Report Missouri Bot. Gard. 10, 41, t. 40 (1899). *C. Ridleyi* Hack. in Oesterr. Bot. Zeitschr. 52, 237 (1902). *Eustachys obtusifolia* (Balansa) A. Camus in Lecomte, Fl. Indo-Chine, 7, 541 (1923).

*Distrib.* China (Hainan), Tonkin, Siam, Malay Peninsula, Celebes and the Philippines.

## V.—GRAMINEAE AUSTRALIENSES: III.\*

C. E. HUBBARD.

***Coelorhachis rottboellioides*** (R. Br.) Stapf ms., comb. nov. *Ischaemum rottboellioides* R. Br. Prodr. 205 (1810). *Andropogon rottboellioides* (R. Br.) Steud. Syn. Pl. Glum. 1, 382 (1854). *Rott-*

\* Continued from K.B. 1934, 451.



*boellia ophiuroides* Benth. Fl. Austral. 7, 514 (1878). *R. ophiuroides* Benth. var. *genuina* Hack. in DC. Monogr. Phan. 6, 304 (1889). *Manisuris rottboellioides* (R. Br.) O. Kuntze, Rev. Gen. Pl. 779 (1891). *Rottboellia rottboellioides* (R. Br.) Druce in Rep. Bot. Exch. Cl. Brit. Isles, 4, 644 (1917).

**Sporobolus Mitchellii** (Trin.) C. E. Hubbard, comb. nov. *Vilfa Mitchellii* Trin. in Mém. Acad. Imp. Sci. St.-Pétersb. sér. 6, 6, pt. 2, 53 (1840). *Sporobolus Benthami* F. M. Bailey in Queensl. Dept. Agri., Bot. Bull. no. 13, 16 (1896).

**Leptochloa Brownii** C. E. Hubbard, nom. nov. *Cynodon polystachyus* R. Br. Prodr. 187 (1810). *Leptochloa polystachya* (R. Br.) Benth. Fl. Austral. 7, 617 (1878), non Kunth (1829).

**Leptochloa debilis** Stapf ms., nom. nov. *Eragrostis imbecilla* Benth. Fl. Austral. 7, 643 (1878), quoad descr. et specim., non *Poa imbecilla* G. Forst. (1786).

**Leptochloa asthenes** (Roem. et Schult.) C. E. Hubbard, comb. nov. *Poa imbecillis* R. Br. Prodr. 181 (1810), non G. Forst. (1786). *Poa asthenes* Roem. et Schult. Syst. Veg. 2, 574 (1817). *Eragrostis imbecilla* (R. Br.) Steud. Syn. Pl. Glum. 1, 279 (1854).

**Eragrostis australasica** (Steud.) C. E. Hubbard, comb. nov. *Glyceria australasica* Steud. Syn. Pl. Glum. 1, 286 (1854). *Poa ramigera* F. Muell. in Trans. Vict. Inst. 1855, 45, et Fragm. Phyt. Austral. 8, 131 (1873). *Glyceria ramigera* F. Muell. ex Benth. Fl. Austral. 7, 659 (1878).

The basal hilum and gelatinous pericarp of its grain, membranous 3-nerved lemmas, ciliate ligules and the anatomy of its leaf-blades are characteristic of the genus *Eragrostis*.

**Plectrachne Drummondii** C. E. Hubbard, sp. nov.; affinis *P. danthonioidi* (F. Muell.) C. E. Hubbard, a qua culmis et foliorum vaginis elanatis differt.

*Gramen* perenne, caespitosum, 1.2–1.6 m. altum. *Culmi* erecti, validiusculi, simplices, solidi, rigidi, circiter 3-nodes, tenuiter striati, praecipue nodos versus dense et minute pubescentes. *Foliorum vaginae* elongatae, rigidae, teretes, tenuiter striatae, striis minute asperulis, ceterum glabrae et laeves, basales imbricatae, ceterae internodiis demum breviores; ligulae ad seriem densam ciliorum redactae; laminae angustissime lineares, setaceae, pungentes, ad 50 cm. vel ultra longae, teretes, arcte involuto-conduplicatae, circiter 1.5 mm. diametro, rigidissimae, subtus glabrae et laeves, supra dense et minute pubescentes. *Panicula* linearilanceolata, laxa, 40–45 cm. longa, 3–4 cm. lata; rhachis scaberula; rami simplices vel infimus divisus, gracillimi, flexuosi, scaberuli,

ad 10 cm. longi; pedicelli flexuosi, scaberuli vel minute hispiduli, 15–18 mm. longi. *Spiculae* oblongae, demum hiantes, 18–20 mm. longae (aristis exclusis). *Glumae* anguste oblongo-lanceolatae, acuminatae, obtusae vel emarginatae, subaequales, 11–16 mm. longae, mucronatae vel aristam ad 1.5 mm. longam gerentes, dense et minute asperulae, 5–9-nerves. *Anthoecia fertilia* 4–7; callus acutus, 1–1.5 mm. longus, dense barbatus; rhachillae internodia 2–3 mm. longa. *Lemmata fertilia* oblonga (explanata), 6.5–7 mm. longa (aristis exclusis), coriacea, dorso et marginibus basin versus laxe et molliter pubescentia, 8–11-nervia; aristae 3-nerves, demum curvatae, laterales ad 11 mm. et mediae ad 13 mm. longae. *Paleae* anguste oblongo-lanceolatae, truncatae, 8–8.5 mm. longae, firme membranaceae, carinis supra medium pilis brevissimis patentibus rigide ciliolatae. *Antherae* 4–4.5 mm. longae.

WESTERN AUSTRALIA: Melbourne District; west from Wongan Hills, 13.10.1903, Morrison (Herb. Perth.); without precise locality, Drummond 128 (typus).

**Plectrachne Dielsii** C. E. Hubbard, sp. nov.; affinis *P. Drummondii* C. E. Hubbard, a qua paniculis spiculis et glumis brevioribus differt.

*Gramen* perenne, dense caespitosum, 1.1 m. altum. *Culmi* erecti, validiusculi, rigidi, solidi, simplices, infra medium circiter 1-nodes, praecipue paniculam et nodos versus minutissime pubescentes, ceterum minute asperuli. *Folia* plerumque basalia; vaginae striatae, minute asperulae, inferiores latae, arcte imbricatae, rigidae, marginibus ciliatae, ore breviter barbatae, ceterum glabrae, superiores appressae, teretes, internodiis breviores, ore ciliatae; ligulae ad seriem densam ciliorum redactae; laminae angustissimae, pungentes, ad 25 cm. longae, arcte involuto-conduplicatae, teretes, 1–1.3 mm. diametro, rigidissimae, patentes vel recurvatae, subtus glabrae et laeves, supra dense et minutissime pubescentes, basi villosulae. *Panicula* lanceolato-oblonga, laxa, circiter 25 cm. longa, 3.5–5 cm. lata; rhachis angulis scaberula, dense et minutissime pubescens; rami solitarii, simplices, 6–1-spiculati, tenuiter filiiformes, flexuosi, scaberuli, inferiores ad 5 cm. longi; pedicelli scaberuli, flexuosi, 4–10 mm. longi. *Spiculae* oblongae, 10–15 mm. longae. *Glumae* chartaceae, dense et minute asperulae, oblongae vel oblongo-lanceolatae (explanatae), acutae vel obtusae, subaequales, 6–8 mm. longae, tenuiter 5–6-nerves. *Anthoecia fertilia* 3–4; callus acutus, 0.5–1 mm. longus, dense barbatus; rhachillae internodia 2 mm. longa. *Lemmata fertilia* ovato-oblonga (explanata), 5–6 mm. longa (aristis exclusis), coriacea, dorso et marginibus pubescentia, ceterum glabra et laevia, 11-nervia; aristae 1–3-nerves, strictae, laterales ad 8 mm., mediae ad 10 mm. longae. *Paleae* anguste oblongae, acuminatae, apice truncatae, 7–7.5 mm. longae, carinis basin versus pilis appressis ciliatae et supra medium pilis

patentibus vel reflexis breviter ciliolatae, firme membranaceae. *Antherae* 3.5–4.5 mm. longae.

WESTERN AUSTRALIA: Avon District; Tammin, in dry open sandy thickets, 250 m., 25.10.1901, *Diels* 5085 (Herb. Berol.).

***Plectrachne Melvillei*** C. E. Hubbard, sp. nov.; affinis *P. Dielsii* C. E. Hubbard, a qua lemmatibus paleis et antheris brevioribus, callo rotundato-obtusum, foliorum vaginis siccitate resiniferis differt.

*Gramen* perenne, dense caespitosum, 50–80 cm. altum. *Culmi* erecti, graciles, solidi, simplices, 1–2-nodes, glabri, laeves vel asperuli. *Foliorum vaginae* inferiores latiusculae, imbricatae, coriaceae, marginibus scariosis, nitentes, viscosae, siccitate resiniferae, pallide stramineae, basi et dorso et marginibus villosae, vel ore barbato excepto glabrae, laeves, superiores internodiis breviores, glabrae, laeves vel asperulae; ligulae ad seriem ciliorum brevissimorum redactae; laminae setaceae, pungentes, ad 30 cm. longae, teretes, arcte involuto-conduplicatae, 0.8–1.3 mm. diametro, rigidae, subtus glabrae et laeves, supra dense et minute pubescentes. *Panicula* anguste lanceolata vel oblonga, contracta vel densiuscula, 10–30 cm. longa, 2–3 cm. lata; rhachis glabra, laevis vel scaberula; rami plerumque solitarii, erecti, filiformes, simplices, scaberuli; pedicelli laterales 1.5–8 mm. longi. *Spiculae* anguste oblongae, 12–15 mm. longae (aristis exclusis). *Glumae* lanceolato-oblongae, acutae, breviter aristatae, 6–11 mm. longae, tenuiter chartaceae, marginibus membranaceis, pallide brunneae, glabrae, laeves vel asperulae, 3–5-nerves. *Anthoecia fertilis* 4–8; callus 0.3–0.5 mm. longus, rotundo-obtusum, dense et breviter barbatus; rhachillae internodia 1 mm. longa. *Lemmata fertilis* oblonga (explanata), 4 mm. longa (aristis exclusis), tenuiter coriacea, dorso seriebus pilorum appressorum brevium obscure pubescentia, 9-nervia; aristae erectae vel curvatae, 3-nerves, laterales ad 7 mm. longae, mediae ad 9 mm. longae. *Paleae* angustissime elliptico-oblongae, obtusissimae, 4.5–5 mm. longae, firme membranaceae, infra medium inter carinas minute pubescentes, carinis angustissime alatis et alis ciliolatis. *Antherae* 2–2.5 mm. longae.

WESTERN AUSTRALIA: Wiluna District, mostly associated with Mulga, July, 1937, *Melville* in *Herb. Burbidge* 458 (typus).

NORTHERN TERRITORY: Petermann Ranges; Docker Gorge, July, 1926, *Basedow* 153.

***Plectrachne desertorum*** C. E. Hubbard, sp. nov.; affinis *P. rigidissimae* (Pilger) C. E. Hubbard, a qua spiculis longioribus, glumis longioribus 8–13-nerviis vel acutis vel 3-dentatis vel 3-aristatis, paleis longioribus differt.

*Gramen* perenne caespitosum, 40–60 cm. altum; innovationes numerosae, foliosae, ramosae. *Culmi* erecti, graciles, simplices, solidi, 2-nodes, glabri, laeves. *Foliorum vaginae* innovationum arcte

imbricatae, teretes, coriaceae, marginibus et apice ciliatae vel villosae, ceterum glabrae, eae culmorum internodiis demum breviores, glabrae, laeves; ligulae ad seriem densam ciliorum redactae; laminae setaceae, valde pungentes, 4–10 cm. longae, teretes, arcte involuto-conduplicatae, circiter 1 mm. diametro, rigidissimae, erectae, demum horizontaliter patentes, subtus glabrae, laeves, supra dense et minute pubescentes. *Panicula* angusta, laxissima, 10–15 cm. longa, 2–3 cm. lata; rhachis gracilis, scaberula; rami bini vel solitarii, tenuiter filiformes, flexuosi, scaberuli, plerumque 1-spiculati, 1–4 cm. longi. *Spiculae* (juveniles) oblongae, 15–18 mm. longae (aristis exclusis). *Glumae* oblongo-lanceolatae, firme chartaceae, superne minute et obscure asperulae, vel acutae vel tridentatae vel uni- vel tri-aristatae, aristis 1–4 mm. longis; inferior 10–13 mm. longa, 9–13-nervis; superior 11–15 mm. longa, 8–9-nervis. *Anthoecia fertilis* 3–5; callus acutus, 1.5–1.7 mm. longus, barbatus; rhachillae internodia 2 mm. longa, glabra. *Lemmata fertilis* oblonga (explanata), 4–7 mm. longa (aristis exclusis), coriacea, dorso et marginibus pubescentia, 11–13-nervia; aristae erectae, 3-nerves, laterales ad 11 mm. longae, mediae ad 16 mm. longae. *Paleae* oblongae, obtusae, 5–8 mm. longae, pilis appressis sericeis dense pubescentes. *Antherae* ad 4 mm. longae.

WESTERN AUSTRALIA: Weld District; east of Laverton, July, 1916, *Geological Survey Exped.* 145; Victoria Desert, 16.9.1891, *Helms* (typus).

***Plectrachne Helmsii*** C. E. Hubbard, sp. nov.; affinis *P. pungenti* (R. Br.) C. E. Hubbard, a qua glumis et lemmatibus longioribus, paleis membranaceis differt.

*Gramen* perenne caespitosum, circiter 80 cm. altum. *Culmi* erecti, graciliusculi, simplices, circiter 2-nodes, tenuissime striati, glabri, laeves. *Foliorum vaginae* ore pilis ad 2 mm. longis barbatae vel ciliatae, vel glabrae et laeves, tenuiter striatae, inferiores imbricatae, intermediae et superiores internodiis multo breviores; ligulae ad seriem densam ciliorum redactae; laminae setaceae, valde pungentes, ad 14 cm. longae, teretes, arcte involuto-conduplicatae, 1 mm. diametro, rigidae, erectae vel patentes, subtus glabrae et laeves, supra dense et minute pubescentes. *Panicula* anguste oblonga, contracta, 10–14 cm. longa, 1.5–2 cm. lata; rhachis gracillima, scaberula; rami solitarii, erecti, filiformes, paucispiculati, dense scaberuli; pedicelli dense scaberuli, laterales ad 2 mm. longi, terminales ad 10 mm. longi. *Spiculae* anguste oblongae, 11–13 mm. longae (aristis exclusis). *Glumae* anguste oblongo-lanceolatae, acute acuminatae, plerumque 12–15 mm. longae, subaequales vel superior inferiore paullo brevior, chartaceae, marginibus membranaceis, minute asperulae; inferior 5–7-nervis; superior 5-nervis; rhachillae internodium inter glumas dentem lateralem obtusum vel acutum 0.2–0.5 mm. longum gerens. *Anthoecia fertilis* 3–4; callus acutus, 1 mm. longus, dense et breviter barbatus; rhachillae internodia 2–3 mm. longa, minute

et sparse pubescentia. *Lemmata fertilia* oblonga (explanata), 4.5–5 mm. longa (aristis exclusis), coriacea, pilis appressis brevibus tenuiter pubescentia, 3-nervia, infra aristas linea transversa conspicua praedita; aristae demum recurvatae, scaberulae, 3-nerves, laterales ad 8 mm. longae, mediae ad 12 mm. longae. *Paleae* anguste oblongae, acuminatae, apice truncatae vel emarginatae, 5–5.5 mm. longae, membranaceae, carinis angustissime alatis, alis ciliolatis. *Antherae* 2–2.8 mm. longae.

SOUTH AUSTRALIA: Everard Range, 8.6.1891, *Helms*.

**Plectrachne Bynoei** *C. E. Hubbard*, sp. nov.; a ceteris speciebus lemmate infimo uniaristato, lemmatibus membranaceis, spiculis imbricatis in ramis secundis paniculae dispositis differt.

*Gramen* perenne. *Culmi* graciles, paniculam versus minute asperuli. *Foliorum vaginae* coriaceae, nitentes, laeves, marginibus ciliatae, ore rotundo-truncato pilis longis sericeis dense barbatae, ceterum glabrae; ligulae ad seriem ciliorum redactae; laminae angustissime lineares, setaceae, curvatae, flexuosae, valde pungentes, ad 45 cm. longae, arcte involuto-conduplicatae, vel explanatae et ad 2.5 mm. latae, subtus glabrae et laeves, supra prominenter nervosae et minutissime pubescentes vel asperulae. *Panicula* contracta, densiuscula, lanceolato-oblonga, flexuosa, 40 cm. longa, 4 cm. lata; rhachis angulata, angulis scaberulis, glabra; rami plerumque solitarii, ascendentes, simplices, secundi, graciles, scaberuli; pedicelli 1–2 mm. longi, scaberuli. *Spiculae* imbricatae, pallidae, anguste oblongae vel demum hiantes, ad 8 mm. longae (aristis exclusis). *Glumae* lanceolatae, mucronatae vel minute aristulatae, membranaceae, 3-nerves, minute asperulae; inferior 7–9.5 mm. longa; superior 5.5–7 mm. longa. *Anthoecia fertilia* 2, glumis breviora; callus 0.2 mm. longus, obtusus, minute pubescens; rhachillae internodia gracillima, 1.5 mm. longa, glabra. *Lemma inferum* oblongum (explanatum), 2–2.3 mm. longum (arista exclusa), membranaceum, breviter pubescens, 3-nerve, 3-lobum, lobis lateralibus lanceolatis acutis 1.2–1.5 mm. longis, lobo medio aristam scaberulam gracillimam planam basi 1–3-nervem circiter 7 mm. longam gerente. *Lemma superum* lemmati infero simile sed triaristatum, lobis lateralibus aristam 4 mm. longam gerentibus, lobo medio aristam 6 mm. longam gerente. *Paleae* anguste oblongae, minute 2-lobae, 2.8–3 mm. longae, tenuiter membranaceae, infra medium inter carinas pubescentes. *Antherae* 1–1.7 mm. longae.

WESTERN AUSTRALIA: "North-west coast," *Bynoe*.

**Amphibromus Whitei** *C. E. Hubbard*, sp. nov.; affinis *A. Neesii* Steud., sed culmis gracilioribus, panicula brevior, spiculis paullo minoribus, glumis et lemmatibus brevioribus, glumis 1–3-nervibus differt.

*Gramen* perenne (?), caespitosum, ad 35 cm. altum. *Culmi* erecti vel geniculati, graciles, simplices, 3-nodes, glabri laevesque.

*Foliorum vaginæ* tenuiter striatae, asperulae vel laeves, internodiis plerumque longiores, basales basi appresse sericeo-pilosae, ceterae glabrae; ligulae angustae, acute acuminatae, ad 8 mm. longae, hyalinae; laminae anguste lineares, acutae, ad 15 cm. longae et 1.8 mm. latae, planae, tenues, glaucae, glabrae, scaberulae. *Panicula* angusta, laxa, ad 10 cm. longa et 1.5 cm. lata, flexuosa, pallide viridis; rhachis gracillima, scaberula; rami plerumque 2-3-nati, filiformes, scaberuli, inferiores ad 5 cm. longi; pedicelli laterales 1-2 mm. longi, terminales multo longiores. *Spiculae* anguste oblongae, 7-10 mm. longae, 1.5-2 mm. latae, laxae 4-5-florae, pallide virides; rhachillae internodia 1-1.3 mm. longa, minute pubescentia. *Glumae* explanatae anguste ovatae, obtusae, hyalinae; inferior 2-2.3 mm. longa, breviter 1-nervis; superior 2.5-3 mm. longa, breviter 3-nervis. *Lemmata* explanata ovato-oblonga, obtuse biloba, 4-4.5 mm. longa, 7-nervia, apice hyalina, ceterum herbacea, demum indurata, muriculata, e medio aristata; arista geniculata, 11-14 mm. longa, columna 5 mm. longa; callus pilis albis ad 1 mm. longis dense barbatus. *Paleae* anguste oblongae vel lanceolato-oblongae, obtusae, 3-3.5 mm. longae, carinis angustissime alatis et superne ciliolatis. *Antherae* 1-3, 0.3-0.5 mm. longae. *Caryopsis* oblongo-ellipsoidea, 1.3 mm. longa.

QUEENSLAND: Maranoa District; Roma, on edge of large fresh-water swamp, 25.10.1933, *White* 9580.

The number of anthers varies from one to three, but when three are present then two are much reduced in size and devoid of pollen. Most florets appear to be cleistogamous as the very small anthers have been found enclosed between the lemma and palea and entangled with the stigmatic hairs at the apex of the caryopsis, whilst in other cases they have been found pressed against the apex of the caryopsis.

Although this species has been described as a perennial on account of the presence of sterile shoots, the rootstock has the appearances of that of an annual grass.

This is the first species of *Amphibromus* to be recorded from Queensland, although it is quite possible that *A. Neesii* Steud. [*A. nervosus* (R. Br.) Druce, *Avena nervosa* R. Br. (1810), non Lam. (1791)] may occur in the Stanthorpe-Wallangarra District, as it has been found in the adjoining parts of N.S. Wales. Five species of *Amphibromus* are now known from Australia; they are *A. Neesii* Steud., *A. Archeri* (Hook. f.) P. F. Morris, *A. Whitei* C. E. Hubbard, *A. recurvatus* Swallen and *A. gracilis* P. F. Morris.

## VI.—WHYTOCKIA AND OSHIMELLA. B. L. BURTT.

In 1919 W. W. Smith (Trans. Bot. Soc. Edinb. 27, 338) proposed the genus *Whytockia* (*Gesneriaceae*) for the accommodation of *Stauranthera chiritiflora* Oliv. When originally describing this

species Oliver (Hook. Ic. Pl. 25, t. 2454: 1896) recognized its anomalous position in *Stauranthera* but decided that it was undesirable to establish a new genus "in view of the artificial character of many already described and the influx of new forms from Eastern Asia." Further discoveries, however, have not brought to light any species linking *S. chiritiflora* to the other species of *Stauranthera* and the establishment of the genus *Whytockia* seems fully justified.

More recently another genus, *Oshimella*, has been proposed by the Japanese botanists G. Masamune and S. Suzuki (Journ. Soc. Trop. Agric. 6, 571: 1934) for two Formosan plants: one a new species, *O. formosana*, the other based on *Rhynchoglossum Sasakii* Hayata (Ic. Pl. Formos. 6, 34: 1916). I have seen no authenticated specimens of these species, but there is a Formosan specimen in the Kew herbarium that evidently belongs to one of them. From the description and illustration there is no doubt that they are congeneric with *Whytockia chiritiflora*, and the genus *Oshimella* is accordingly reduced to *Whytockia*.

*Oshimella*, however, was not validly published, as it was not described in accordance with the International Rules. The original publication of *Oshimella* consists of a combined generic and specific description of *O. formosana* and a new combination for a second species, *O. Sasakii*. Under Art. 43 a generico-specific description is valid only for monotypic genera, whereas *Oshimella* included two species at its inception.

Masamune and Suzuki described *Oshimella* as having alternate leaves, but their photograph shows that *O. formosana* is very similar in leaf characters to *Whytockia chiritiflora*. The leaves are not alternate, but show very strongly the anisophylly which is not an uncommon character in *Gesneriaceae*.\*

*Whytockia* is certainly closely allied to *Stauranthera*, but differs from it in a number of characters. The calyx is quite small and 5-lobed, not in any way resembling the campanulate, winged calyx of *Stauranthera*. The corolla has a well-developed tube, and resembles *Chirita*, as Oliver pointed out, rather than *Stauranthera*. In correlation with the long corolla-tube the filaments are slender and the stamens didynamous, contrasting with the short, thick, equal filaments of *Stauranthera*. In this respect the difference between *Whytockia* and *Stauranthera* is of the same order as that between *Haberlea* and *Ramonda*.

From the descriptions it seems quite probable that *Oshimella Sasakii* and *O. formosana* are but a single species, and therefore no

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\* Many instances are described in W. Figdor, Die Erscheinung der Anisophyllie, 88 (1909).

combination for the later of these names is proposed at present. *O. Sasakii* becomes :—

**Whytockia Sasakii** (Hayata) B. L. Burtt, comb. nov. *Rhynchoglossum Sasakii* Hayata, Ic. Pl. Formos. 6, 34 (1916). *Oshimella Sasakii* (Hayata) Masamune et Suzuki in Journ. Soc. Trop. Agric. 6, 571 (1934).

## VII.—MISCELLANEOUS NOTES.

**Royal Horticultural Society.**—We record with pleasure the award of the following Honours by the Council of the Royal Horticultural Society: the Victoria Medal of Honour to MAJOR F. C. STERN, O.B.E., M.C.; the Veitch Memorial Gold Medal to MR. T. HAY, Superintendent of the Royal Parks, on his retirement; and the Loder Rhododendron Cup to DR. J. HUTCHINSON, Keeper of Museums, Royal Botanic Gardens, Kew.

**A New Combination in Hakea.**—In the course of naming a collection of *Proteaceae* from south-east Australia it was found that the following new combination was required :—

**Hakea salicifolia** (Vent.) B. L. Burtt, comb. nov. *Embothrium salicifolium* Vent. Jard. Cels. t. 8 (1800). *Embothrium salignum* Andr. Bot. Rep. 3, t. 215 (1802). *Conchium salicifolium* Gaertn. f. De fruct. et sem. 3, 217, t. 219 (1807). *Conchium salignum* (Andr.) Sm. in Trans. Linn. Soc. 9, 124 (1808). *Hakea saligna* (Andr.) Knight, Proteac. 108 (1809).

B. L. BURTT.

**Chronica Botanica.**—Several numbers of this international publication have been received. It is now being published fortnightly in the U.S.A. (P.O. Box 151, Waltham, Mass.)

**Index Londinensis.\***—An achievement of outstanding importance is signalled by the publication, in two parts, of the Supplement (covering the years 1921-35) to the Index Londinensis, a work which the passage of time has proved to be indispensable to all students of systematic botany and horticulture. Its publication marks the conclusion of a most valuable work.

Following the system adopted in the main body of the work the citations concern illustrations of phanerogams, ferns and fern allies, those of lower cryptogams, fossil plants and plant anatomy

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\* *Index Londinensis to Illustrations of Flowering Plants, Ferns and Fern Allies: Supplement for the years 1921-35.* Prepared under the Auspices of the Royal Horticultural Society of London at the Royal Botanic Gardens, Kew, by W. C. Worsdell under the direction of Sir Arthur W. Hill. Part I. Pp. [viii+] 497. Part II. Pp. [iv+] 515. Price £10-10-0. (Oxford: Clarendon Press; London: Oxford University Press, 1941.)



being excluded. In order to keep the size of the Supplement within limits only a selection of references is given, but the work of exclusion has been carried out with discrimination by competent compilers at Kew. References published prior to 1921 and accidentally omitted from the main work are included.

Part I consists of 497 pages and contains references to illustrations of plants *Aa* to *Hystrix*, while Part II contains 515 pages of references from *Iaera* to *Zygotritonia*. In these references no distinction is made between species, sub-species, varieties or hybrids so long as they are accompanied by scientific names. Illustrations with a generic name only are not included. No attempt has been made to correct inaccuracies when registering citations, unless they are obviously the result of accidents, but where the names differ from those given in the text, cross-references are supplied.

In accordance with the plan adopted in the main body of the work, old comprehensive genera have been broken up and the segregate names employed—for instance, the six distinct genera now recognised in *Gnaphalium* are arranged alphabetically and numbered in sequence, following the general heading *Gnaphalium*. A number is also attached to each species cited, indicating the genus to which it belongs according to the most recent view.

Symbols are used to indicate whether the illustration is coloured (shown by an \*), or whether of a flower only (*Fl.*), fruit only (*Fr.*), habitus figure only (*Hab.*). Hybrids are indicated by an X. Another useful feature is that where subspecies, varieties, subvarieties or forms are figured in the same work this is indicated by the use of the abbreviations *subsp.*, *var.*, *subvar.*, and *forma* after the reference concerned, or under the specific heading when all the references under that heading are concerned. Generic and specific names are arranged alphabetically, while the references are chronological.

The Supplement, which has been prepared by Mr. W. C. Worsdell and Miss R. Burford, under the direction of Sir Arthur Hill, maintains its high standard both as regards orthography and consistency in the method of citation. Congratulations are due to those responsible for the task of compilation and systematising references to approximately 100,000 plant illustrations, and to the Clarendon Press for the excellence of the printing.

It is not proposed to print a further supplement, but as it is necessary in taxonomic work to keep such works of reference up to date, a card catalogue of new illustrations published from 1936 onwards is being prepared by the Royal Botanic Gardens, Kew. Copies of this catalogue will be available at a modest price.

**The Diseases of the Coconut Palm.\***—Coconut diseases constitute some of the most difficult problems the plant pathologist

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\* By H. R. Britton-Jones. Pp. xvi+176, 37 plates, diagram and graphs. Bailliere, Tindall & Cox, London, 1940. Price 10s. 6d.

has to deal with. Not only is the tree an awkward subject for research but the diseases to which it is liable include some which are very obscure in etiology, and have given rise to much speculation. The work before us, completed by the author only a short time before his death in November, 1936, has been brought up to date by Professor E. E. Cheesman, and gives a concise, critical survey of our available knowledge of the subject, which should prove of good service to plant pathologists generally as well as to growers and agricultural officers.

In the first chapters the author discusses the bud rot complex, and differentiates four types of bud rot, namely, bronze leaf wilt—a physiological trouble associated with insufficient soil moisture; *Phytophthora* bud rot due to *P. palmivora*, a disease much less virulent in the West Indies than in India; tapering stem wilt or pencil point, due to starvation and induced in various palms in Trinidad by the long drought of 1926; and red ring, caused by the nematode *Aphelenchus cocophilus*. Five further chapters are devoted to false wilt and lightning strike, stem bleeding disease, root diseases, leaf diseases, and gumming disease and dropping of nuts. The work is, however, not merely a compilation. The personal views of the author are set out with a refreshing vigour and are by no means the least valuable part of the book. For instance, he regards Ashby's leaf-bitten diseases as merely manifestations induced by *P. palmivora*, sometimes supplemented by *Ceratostomella paradoxa* or yeasts as secondary invaders. Problems of control are discussed with a healthy regard for the limitations imposed by practical difficulties, and some useful suggestions are made. The proposal to use the palm *Chrysalidocarpus lutescens* as an index plant in the investigation of physiological troubles is interesting and may well prove of service to future investigators.

The book comprises 176 pages, 87 of which are occupied with the text, 16 by the bibliography, and the rest the plates. It is attractively printed and illustrated with many good photographs and with an excellent coloured frontispiece. The work constitutes a valuable contribution to the literature of the subject, and it is regretted the author did not live to see the fruition of his labour.

S. P. WILTSHIRE.

**The Useful and Ornamental Plants in Trinidad and Tobago.\***—The senior author of this book has spent many years in Trinidad engaged in both horticultural and botanical work, and has been able to incorporate much of his own experience and observation in it. The present edition differs from the earlier ones (1927 and 1928) in that it has been largely extended, and includes notes on 140 additional species. The lists of economic plants

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\* By R. O. Williams, Deputy Director of Agriculture, and R. O. Williams, Jnr. Government Printer, Trinidad. Pp. 265. Price 1\$.

have been completely rearranged, and an entirely new feature is the descriptive keys of ornamental plants, based on simple characters. These should prove a valuable feature to the general reader—assuming they function satisfactorily, which use and time alone can prove—for the naming of exotic plants is often very difficult for those with restricted facilities, especially as such plants are generally omitted from local floras and in handbooks.

The subject matter is in alphabetical order according to the botanical name, with cross references for common names. Some cultural notes are included at the end of the book. From one to four pages are devoted to important crop plants, like Cacao, the Banana and Citrus (a group on which Mr. Williams, Snr., is himself an acknowledged authority), and about half a page to minor crops, such as Cassava, Sweet Potato, Pineapple and Vanilla. Among decorative plants, no less than 14 varieties or cultivated forms of *Bougainvillea* are described, including new introductions, and some eight to ten lines are devoted to such plants as *Caesalpinia pulcherrima*, *Barleria cristata*, *Quisqualis indica* and *Abrus precatorius*. The amount of space allotted to each species has been decided with care and good judgment, and this extremely useful book should have a wide appeal not only to those resident in the West Indies but throughout the tropics, its low price proving an additional attraction.

F. H. HOWES.

**Swahili Plant Names.\***—The fact that a second edition of Mr. Greenway's modest little Dictionary of Swahili Plant Names has been printed is a proof of its utility. The new booklet contains many additional native names, and there have also been added a separate list of botanical and common English names, besides ten pages of diagrams to illustrate the short glossary of botanical terms. We note one or two trifling errors: "Afromomum" for *Aframomum*, "tripinnate" for *bipinnate* (diagram), and "capitula" for *capitulum*. Except for its increased thickness the booklet looks much the same, and as noted in our previous review (K.B. 1938, 87) the printing is excellent.

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\* "A Swahili-Botanical-English Dictionary of Plant Names," by P. J. Greenway, F.L.S. Government Printer, Dar es Salaam, 1940; pp. 308. Price 4s. Second and enlarged edition.

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By the South Essex Records, Ltd., Ilford.

(1041) Wt 20/23 375 10/41 S.E.R. Ltd. Gp. 381

# BULLETIN OF MISCELLANEOUS INFORMATION No. 2, 1941 ROYAL BOTANIC GARDENS, KEW

## VIII—THE PLANT FORMATIONS OF WESTERN BRITISH SOMALILAND AND THE HARAR PROVINCE OF ABYSSINIA.

J. B. GILLETT.

When the boundary between British Somaliland and Ethiopia was being demarcated in 1931, Kew was invited by the Colonial Office to send a botanist to be attached to the Boundary Commission. Thanks to the existence at that time of the Empire Marketing Board's Grant to Kew, it was possible to take advantage of this valuable invitation, and Mr. J. B. Gillett, then a scholar of King's College, Cambridge, was appointed botanist with the Commission (see Kew Bull. Annual Review, 1932, p. 4, and 1933, p. 4).

Unfortunately, there has been a long delay in working out the extensive collections made by Mr. Gillett, which he was unable to do himself owing to other duties; the work, therefore, had to be carried out by members of the African Section of the Herbarium Staff, when time could be spared from their normal work on the numerous collections then being received from West Tropical Africa. With the conclusion of the "Flora of West Tropical Africa" in 1936, it was possible to complete the identification and enumeration of Mr. Gillett's collection and to write the full account.

Owing to the outbreak of the war and Government restrictions on printing, the publication of the paper has suffered further delay, but now with the recovery of British Somaliland and the restoration of Ethiopian sovereignty, we are fortunate in being able to publish Mr. Gillett's valuable contribution to the Flora of Somaliland and the adjacent regions of Abyssinia.

A. W. H.

### SETTING AND PHYSIOGRAPHY.

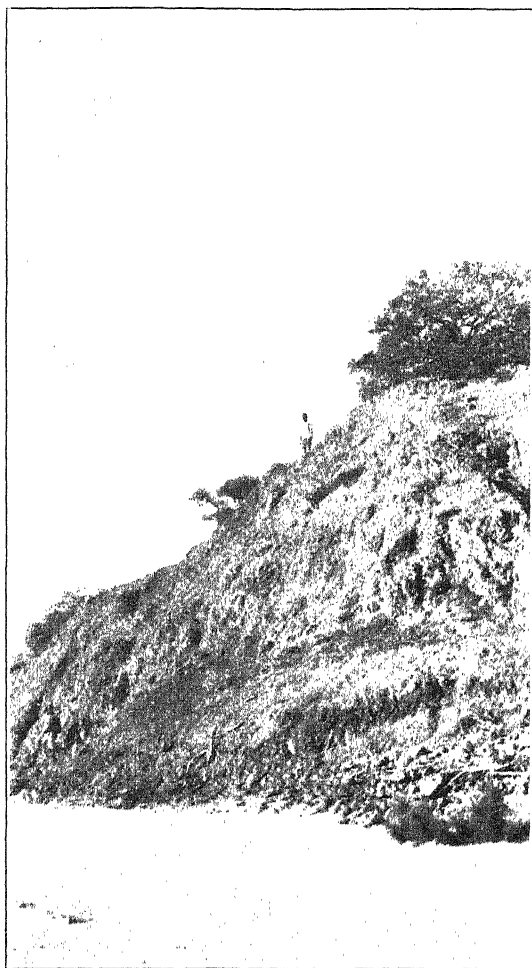
The area dealt with lies between  $41^{\circ} 30'$  and  $45^{\circ} 30'$  E. and  $8^{\circ} 30'$  and  $11^{\circ} 30'$  N. It includes five topographic regions:—(1) the Gulf of Aden coastal plain, or Guban, 40 to 110 kilometres in width, broken in places by hills and small mountains, usually representing faulted-down blocks of the plateau; (2) the mountains forming the margin of the plateau from 1,200 to 1,800 m. high. These are much broken up by river valleys running down from the watershed, some 40 to 80 kilometres behind the edge of the plateau; (3) the high part of the plateau including the watershed and the area between this and the edge of the plateau, known in parts as Ogo; (4) the great plains sloping gently down to the south of the

## GEOLOGY.

In the Guban, Ogo and the Harar massif a basis of archæan schists, granites and gneiss is partly exposed and partly covered by limestone or sandstone, the limestone being Jurassic in the west



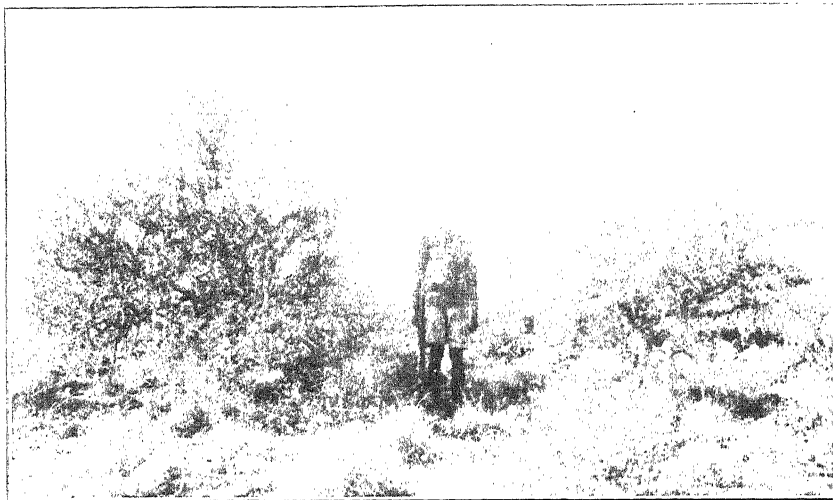
PLATE I.



*The sub-desert formation at Biyu Anot, 42° 42' E., 10° 32' N. 750 m.*

*Dobera glabra*\* on the right. The "tug," whose sandy bed is seen in the foreground, by cutting into its banks, has exposed the roots of the Garas. These had penetrated the soft lava rock as far as where the lower Somali is standing, some 12 m. below the bush. Here where they reach the water in the bed of the tug one was still 7 cm. and another 5.5 cm. in diameter. This illustrates how such trees and bushes as are found in the sub-desert are dependent on underground water, often at considerable depths.

[To face page 38.



1. *Commiphora* -bush *Acacia* open scrub formation at Mard, 10° 10' N., 44° 8' E., 500 m., *Commiphora cuspidata*\*, a tufted grass, *Cymbopogon Schoenanthus*, and in the background *Acacia somalensis*\*.



2. Tree *Acacia* open woodland formation. *Acacia Bussei* Harms\* association in the "Haud," British Somaliland-Abyssinian boundary at Pillar 105, 44° 10' E., 8° 57' N., 4,200 ft.

All the trees are *A. Bussei*\*, the grass in the foreground is *Sporobolus variegatus*\*. A root of the tree at the extreme right, by the Somali, has been excavated. Keeping about 15 cm. below the surface it reaches as far as the Englishman at the left of the picture, a distance of 18 m. Thus the open spaces in this association are, below the ground, occupied by a network of *Acacia* roots.

and Eocene in the east. In the Haud the limestone is continuous. In places in the Guban and along the edge of the plateau lava-flows occur. Many parts of the Guban are covered by alluvium.

#### CLIMATE.

There is a double rainy season over the greater part of the area, one rainy period being about May and another about August. In addition in the Guban and the coastal mountains a more or less regular winter rainfall occurs. The rainfall is scanty everywhere except in the Harar massif and a few small parts of the coastal mountains. Such weather records as are available are referred to in more detail in the accounts of the different plant formations.

#### THE PLANT FORMATIONS.

The following seven plant formations, in Clements' sense of the word, occur :—(1) Subdesert ; (2) *Commiphora*—bush *Acacia* open deciduous scrub ; (3) Tree *Acacia* open woodland ; (4) Tree *Commiphora*—*Acacia*—*Combretaceae* deciduous scrub ; (5) Evergreen scrub ; (6) Evergreen forest ; and (7) *Erica* thickets. The areas occupied by these formations so far as they were ascertained are shown on the accompanying map.

##### 1. THE SUBDESERT.

The vegetation is composed of scattered, dwarf, woody plants less than half a metre high with small, usually hairy leaves, and scattered, tufted, grasses. Trees and bushes are found only beside watercourses, or where there is underground drainage water. The plants, although very openly spaced above ground, form a closed network of roots below and no such complete absence of vegetation occurs as in a true desert.

This formation seems comparable with the vegetation of the coastal plain in eastern British Somaliland, and perhaps with that of sandy soil in the Hormo district (10° 33' N. by 48° 59' E.) described by Collenette (31).

The area occupied lies along the coast up to an altitude of about 150 m. and on the 900 m. plateau crossed by the railway from Dire-dawa to Jibuti.

*Environment.*—Rainfall : records for two stations, Berbera and Zeilah, are available. At Berbera the average rainfall over 11 years was 51.7 mm. and at Zeilah over 7 years, 127.75 mm. In this period the minimum annual rainfall was 9.3 mm. at Berbera and 16.6 mm. at Zeilah. One year in three has a rainfall of under 25.4 mm. at Berbera and under 50.8 mm. at Zeilah. Most of the rain falls in winter or early spring in showers. On an average there are 6 months in the year at Berbera without a trace of rain and at Zeilah 5, while in some years there may be 8 or 9 months



without rain. Probably of very great importance for the establishment of seedlings are occasional unusually rainy years. In 1926, for instance, 166 mm. of rain fell at Berbera and 273.5 mm. at Zeilah, only 3 months being without rain at Berbera and 2 at Zeilah.

Temperatures: The absolute annual shade maxima are between 41° C. and 49° C. and the minima from 10° C. to 16° C. The average mean monthly maximum is about 33.5° C. Of course in the more elevated parts of this formation lower temperatures may be expected.

The soils here are either pale sands or grey and powdery. The six samples examined were all rich in lime and strongly alkaline. In many places accumulations of chlorides or of gypsum and sodium salts occur. The presence of these salts certainly exerts a strong influence on the vegetation and accounts for some strange phenomena. For instance at Berbera imported trees grown under irrigation sometimes die after the rare heavy rainstorms. This is probably because the storm raises the level of the saline ground water so that it kills the roots of the trees.

*Communities within the subdesert formation.*—These may be distinguished according to the following habitats:—(1) eluvial soil, not deep sand; (2) deep sand; (3) places where ground water is available; (4) places where salts accumulate — Halosere; (5) Hydrosere.

(1) On eluvial soil other than deep sand, the dominant plants are woody herbs usually between 10 and 50 cm. tall, with smallish hairy leaves, and scattered at intervals of a metre or more. Such are *Aerva tomentosa* Forssk.\*, *Jatropha glandulosa* Vahl. and *Farsetia longisiliqua* Decne. Between these are scattered tufted grasses and small woody dicotyledons. The absence or great scarcity of succulents is noteworthy. Among the grasses and sedges are *Aristida* sp. (4664)†, *Enneapogon* sp. (4665), *Aristida abnormis* Chiov., *Aristida mutabilis* Trin. and Rupr., *Aristida* sp. (4750) and *Cyperus conglomeratus* Rottb.

(2) On deep sand occur almost pure societies of the chamaephytic grasses, *Eragrostis hararensis* Chiov.\* or *Panicum turgidum* Forssk.\* Sometimes the two occur together. They are from 10 to 40 cm. tall and occur at intervals of 40 cm. or more. Their numerous fine roots, which spread in all directions for 50–90 cm., bind the sand.

In slight depressions, whether on sand or other soil, where storm water collects and runs off, suffruticose *Indigoferae* and other plants with deep tap roots are very prominent; such are *Indigofera Ruspoli* Bak. f.\*, *Cucumis prophetarum* L., *Crotalaria dumosa* Franch., *Indigofera arabica* Jaub. & Spach, *Indigofera spinosa* Forssk., *Crotalaria aegyptiaca* Benth., *Pavonia Sennii* Chiov.,

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\* An asterisk indicates the species has a native name; to save space and repetition these have been listed at the end with the scientific names to which they belong (see p. 74); for the same reason the botanical authority is given only once.

† The numbers in brackets are the author's collecting numbers.

*Dipterygium glaucum* Decne, *Tephrosia purpurea* Pers., *T. uniflora* Pers., and *Convolvulus Hystrix* Vahl. In the dry season these deeply-rooted species are conspicuously greener than the grasses around them.

(3) A feature of the subdesert are the alluvial fans in which the "tugs"† from the interior spread out and disappear. In these and in adjacent deep-soiled plains ground-water is within reach of deeply-rooted species, at any rate at certain seasons. *Balanites orbicularis* Sprague\* and *Maerua somalensis* Pax\* in the west, and *Zygophyllum Hildebrandtii* Engl.\* in the east are the principal of these. These three species are all evergreen and deeply rooted. The roots of a 2.75 m. bush of *Dobera glabra* Juss.\* in the subdesert were seen penetrating 12 m. of soft lava and reaching a sandy river bed where they were still over 5 cm. in diameter. In between the very scattered individuals of these species the herbaceous vegetation is usually much the same as where ground-water is lacking. In parts where ground-water is more plentiful *Acacias* occur as well as these evergreen trees. *Acacia spirocarpa* Hochst.\* and *A. sp.* near *Bussei* Harms\* are the chief. Here the herbaceous vegetation is usually richer; geophytes such as *Littonia obscura* Baker, *Scilla carunculifera* Chiov. and *Steinheilila radians* (Forssk.) Decne, are especially common, though they may also be found elsewhere.

If it is to be supposed that these trees depend on underground water, the problem of how their seedlings become established must be solved. The exceptional rainy years which occur in this formation probably play a part, and it is not unlikely that the burrowing rodents, which abound in these parts, may carry the fruits down into their burrows, where those which escaped being eaten would start life in a much more favourable position than the arid surface soil. Phillips (29) mentions that the seeds of *Balanites* are dispersed by fruit-eating mammals. A small thicket of young *B. orbicularis*\* trees which was observed near Elmis might have sprung from an abandoned cache of the fruits made by some burrowing rodent.

The diverse effects of wind erosion on the grasses and the *Indigoferae* in this community are worth mention. The grasses rarely have the sand blown away beneath them, as their numerous fibrous surface roots bind it, and they form low hillocks. The tap roots of the *Indigoferae* afford no such protection, and nothing is more common than to see a length of 10, 20 or 30 cm. exposed by the wind. A certain amount of exposure however does not seem to do much damage to the *Indigoferae*, while it kills the grasses.

(4) The Halosere. Owing to its being next to the sea, and to the fact that evaporation very greatly predominates over rainfall, salty places are frequent in the subdesert. On sheltered shores of deep mud, as at Berbera harbour, the shrub *Suaeda fruticosa* Forssk.\* is dominant. On deep moist sand the two grasses

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† Dry river beds.

*Sporobolus spicatus* Kunth and *Aeluropus lagopoides* (L.) Chiov. form a close sward. On shallow sand above coral rock *Cyperus conglomeratus* grows in scattered tufts, while on dry deep earth occur scattered shrublets of *Salsola foetida* Del.\*

(5) The hydrosere of the subdesert formation may be seen at Biyo anod., 42° 40' E., 10° 35' N., where there is a large tug with permanently running water. The sand of the tug bank is fixed by *Panicum lurgidum*\* and *Tamarix nilotica* Ehrenb.\*, the latter forming dense groves in which occurs the creeper, *Pentalopsis cynanchoides* R. Br.; where these groves are broken up by heavy grazing, *Calotropis procera* Ait.\* is prominent. On ground further above the water and barely flooded, *Acacia spirocarpa* Hochst.\*, *Salvadora persica* L.\*, *Maerua somalensis*\*, *Dobera glabra*\* and *Euphorbia nubica* N.E. Br.\* are dominant, forming dense thickets; creepers are *Cissus rotundifolia* Vahl\* and *C. quadrangularis* (L.) Planch.\*, while *Sansevieria Ehrenbergii* Schweinf. ex Bak.\* is dominant on the ground. The abundance of evergreen and succulent species is noteworthy, also the absence or paucity of any mesophytic ground flora such as is to be seen in similar situations within other formations.

Large tugs at Elmis, 44° 15' E., 10° 20' N., without water near the surface during the dry season, were fringed by thickets of *Acacia spirocarpa*\*, *Ziziphus mauritiana* Lam.\*, *Z. Hamur* Engl.\*, *Balanites orbicularis*\*, *Leptadenia Spartum* Wight\* and *Acacia Senegal* Willd.\* with *Cissus quadrangularis*\* and *Combretum aculeatum* Vent. as climbers. An absence of mesophytic herbaceous forms was noticeable here also.

As shade temperatures of 43° C. are by no means uncommon in parts of the subdesert, the question of the maximum temperatures which plant tissues can endure is sharply raised in it. Some of the animals inhabiting this area are living dangerously near their upper limit of temperature; for instance lizards are said often to die of heat upon being confined in a closed space.

*Economics*.—The subdesert provides a certain amount of grazing for sheep, goats and camels at times when rain has recently fallen.

## 2. THE COMMIPHORA—BUSH ACACIA OPEN DECIDUOUS SCRUB.

The dominant woody plants (except where water is available) are deciduous shrubs, without well-defined trunks and branching from within 1 m. of the ground. They do not exceed 4 m. in height, have small leaves, are usually thorny and resin- or gum-bearing, and often aromatic. The shrubs are spaced well apart so that it is easy to walk between them. Larger trees may occur, scattered at considerable intervals. Between the larger shrubs small ones about 1 m. high occur and the ground vegetation consists of scattered tufts of grass and other plants. On eluvial soils the dominant shrubs are usually species of *Commiphora* and *Acacia*, and on alluvial soils the *Acacia* spp. alone occur.

This formation differs from the *Commiphora*—other species deciduous scrub described by Phillips in Tanganyika Territory in being much more open, in consisting of bushes rather than small trees and in the open scattered nature of the ground vegetation. It seems to be the same as the *Commiphora* community described by Collenette (31) on the northern slopes of the Al hills in eastern British Somaliland, between 300 and 900 m.

The area occupied lies firstly in the south-eastern Haud below about 1,000 m., and secondly in the coastal plain and the lower slopes of the coastal mountains above the subdesert and below about 850 m. This second area becomes very narrow in the extreme west owing to the great extent of the subdesert here.

*Environment.*—No meteorological data are available. It seems clear that the rainfall is less in total amount and less regular than that of the tree *Acacia* open woodland, while greater than that of the subdesert. On the other hand the dry season, certainly in the northern area, and probably in the south-east, is interrupted by occasional rains in January and December. The average temperature is certainly higher than in the tree *Acacia* open woodland so that there will be an even greater preponderance of evaporation over precipitation.

Soils are red, fawn, whitish or light grey and usually contain a high proportion of sand. Deep soils only develop on flat ground as the vegetation is insufficient to prevent their being washed away on slopes, which are therefore always stony or rocky with mere pockets of soil; ten samples were all strongly alkaline even though some were developed from rocks containing no lime. Travertine is usually much less developed than in the tree *Acacia* open woodland but is very prominent where there is ground-water. Organic carbon contents of .088 per cent. and .296 per cent. were found.

The distinction between limestone and non-calcareous rocks seems to make little or no difference to the vegetation in this formation, no doubt because of the absence of leaching and the fact that drainage is always adequate. Salts may accumulate locally in the same way as in the subdesert formation, but less frequently.

*Communities within the Commiphora—bush Acacia open scrub formation.*—The chief communities are:—(1) the climax on eluvial soils; (2) the climax on alluvial soils; (3) hydrosere; (4) overgrazed sub-climax areas; (5) *Rhigozum somalense* Hall. f.\* scrub; (6) a type occurring in the least arid part of the formation on the slopes of the coastal mountains.

(1) *The climax open scrub on eluvial soils.*—The most prominent plants are species of *Commiphora* with their thick, smooth-barked, sappy, strangely contorted branches. Acacias are usually more numerous than the *Commiphoras* though often less conspicuous. In one area of 500 sq. m. there were 45 of the larger bushes 1–3 m.

tall, of which 7 belonged to 3 species of *Commiphora*, 17 to 3 species of *Acacia*, and 20 to 2 other species. These shaded (of course very lightly) approximately  $\frac{1}{4}$  of the area. This seems to be about the average proportion shaded. In the same area there were 76 shrublets under 1 m. high, about  $\frac{1}{3}$ th of them being small individuals of the species already mentioned and the others belonging to 9 other species. Here there were, in 1 sq. m., 4 tufts of grass and 8 other herbaceous plants. The bushes possess an extensive superficial root system so that rain falling on the open ground between them can be utilised. For instance a small individual of *Commiphora cuspidata* Chiov.\*, 1.2 m. high, was found to have roots spreading, between 15 and 35 cm. from the surface, to 8.5 m. distance. The components of the climax scrub differ widely from place to place and in particular those in the Haud are different from those in the north.

The few real trees, which occur widely scattered, are *Acacia spirocarpa*\*, *Balanites aegyptiaca* Del.\* and *Delonix elata* (L.) Gamble\*, the latter alone occurring in the Haud. In the north the chief larger bushes are *Commiphora cuspidata* Chiov.\* and *C. myrrha* var. *molnol* Engl., *Acacia Asak* Willd.\* and *A. somalensis* Vatke\*, *Premna resinosa* Schauert, *Rhigozum somalense*\*, *Euphorbia cuneata* Vahl, and *Euphorbia Thi* Schweinf., the largest succulent in the association. Other bushes are *Commiphora Opobalsamum* var. *induta* Sprague, *Commiphora crenulata* (A. Ven.) Chiov., *C. Gowello* Sprague, *C. tubuk* Sprague, *C. rostrata* Engl., *C. erythraea* Engl.\*, *Acacia mellifera* Benth.\*, *Caesalpinia erianthera* Chiov., *Jatropha spinosa* var. *somalensis* Pax, *Cadaba longifolia* DC.

In the Haud the chief bushes are *Commiphora erythraea*, *C. samharensis* Sprague, *C. obovata* Chiov., *C. Playfairii* Hook., *C. crenulata*, *C. crenato-lobata* Chiov., *C. Gowello*, *C. resiniflua* Martelli, *C. ancistrophora* Chiov., *C. flaviflora* Engl., *Lamnea triphylla* Engl., *Iphiona rotundifolia* Oliv., *Sesamothamnus Smithii* Baker, *Dalbergia commiphoroides* Bak. f., *Caesalpinia Gillettii* Hutch. & E. A. Bruce, *Sarcostemma viminale* R. Br., *Boswellia Bricchettii* Chiov., *Grewia* sp. (4215).

Of the small shrubs, in the north the chief are *Grewia tenax* (Forssk.) Fiori\*, *Iphiona rotundifolia*\*, *Croton Cliffordii* Hutch. et Bruce\* and *C. somalensis* Vatke & Pax, *Tephrosia obbiadensis* Chiov. Others are *Adenia veneata* Forssk.\*, *Adenium somalense* Balf. f. (not common but very conspicuous), *Cadaba glandulosa* Forssk.\*, *Solanum* sp. (4279), *Jatropha spinosa* var. *somalensis* Pax, *Farsetia longisiliqua* Decne, *Cienfuegosia Ellenbeckii* Gurke.

In the Haud the main shrublets are the tall grass *Andropogon cyrtocladus* Stapf\*, *Jatropha parvifolia* Chiov., *Ipomoea Donaldsonii* Rendle, *Adenium somalense* var. *crispum* Chiov., *Lycium europaeum* L., *Hildebrandtia somalensis* Engl., *Blepharispernum fruticosum* Klatt, *Cephalocroton cordofanus* Hochst., *Adenia venenata* Forssk., *Iphiona rotundifolia*.

Some of the chief herbs in the north are :—*Cymbopogon Schoenanthus* Spreng.\*, *Blepharis edulis* (Forssk.) Pers., *Oldenlandia rotata* Baker, *Boerhaavia elegans* Choisy, *Indigofera Ruspoli*\*; others are :—*Sericostoma albidum* Franch., *Boerhaavia repens* L., *Neuracanthus* sp. (4477), *Chrysopogon Aucheri* Stapf var. *quinqueplumis* Stapf\*, *Barleria acanthoides* Vahl, and the succulents :—*Aloe trichosantha* Berger\*, *Portulaca Wightiana* Wall., *Caralluma Edithae* N.E. Br., *Euphorbia longetuberculosa* Hochst., *E. nigrispina* N.E. Br., *E. triaculeata* Forssk. In the Haud, *Sporobolus Ruspolianus* Chiov., *Ceropegia subaphylla* K. Schum., *Raphanocarpus Stefaninii* Chiov., *Sarcostemma viminalis*, *Indigofera Ruspoli*\*, *Dorstenia crispa* Engl. and *Vernonia cinerascens* Sch. Bip. are some of the more important herbs.

(2) *The climax bush Acacia community on alluvial soils.*—In the Haud this community occurs in the very slight depressions which alternate on the surface of the plain with equally slight ridges, the latter being covered by the *Commiphora*-bush *Acacia* open scrub. The alternation between the two communities is very striking, as the plain seems as nearly uniform as it is possible to imagine. In the north scattered *Balanites orbicularis*\* and *B. aegyptiaca*\* occur; in the Haud trees are wholly absent. The *Acacia* bushes are dense, 1–2 m. high, and flat-topped. In the north the dominants are *Acacia Sieberiana* DC\* on sand and *A. sp.?* nr. *Bussei*\* (4172 and 4742) on other soils. In the Haud *A. misera* Vatke\* is dominant, *A. Senegal*\*, *A. sp.?* nr. *Bussei*\* (4172), *A. Sieberiana*\*, and *A. mellifera*\* also occur, but much less often. Frequently large areas are covered by unbroken stretches of one or other of these *Acacias*. An occasional larger bush is *Boscia minimifolia* Chiov.\* Other shrubs are *Cadaba farinosa* Forssk.\*, *Grewia tenax*\*, *Lycium europaeum* in the north, and *Grewia tenax*\*, *Cordia Gharaf* Ehrenb.\*, *Caucanthus edulis* Forssk., *Ehretia obtusifolia* Hochst.? (4168), *Grewia erythraea* Schweinf., *Maerua sessiliflora* Gilg\* in the Haud. In the north *Indigofera Ruspoli*\* and *Iphiona rotundifolia*\* are abundant as small woody plants between the *Acacias*. Grasses and sedges which may be locally dominant among the herbs in the north are *Eragrostis hararensis*\*, *Cyperus* sp. (4434), *Lasiurus hirsutus* Boiss. forma, *Chrysopogon Aucheri* var. *quinqueplumis*\*, *Sporobolus variegatus* Stapf\*, *Chaetostichium minimum* (Hochst.) C. E. Hubbard, *Dignanthia villosa* C. E. Hubbard, *Enteropogon barbatus* C. E. Hubbard and *Chloris myriostachya* Hochst. Other herbs are *Crinum ornatum* (L. f.) Bury, *Euphorbia nigrispina*, *Ceropegia nuda* Hutch. & E. A. Bruce, *Blepharis edulis*, *Barleria Hochstetteri* Nees, *Corchorus cinerascens* N.E. Br., *Hibiscus micranthus* L., *Indigofera intricata* Boiss., *Eremopogon foveolatus* Stapf, and *Tricholaela teneriffae* Parl. in the north, and *Craterostigma plantaginea* Hochst., *Abutilon molle* Baker, *Cyclocheiton somalense* Oliv., *Sarcostemma viminalis*, *Scilla somaliensis* Baker, *Commelina albescens* Hassk., *Coccinea laevigata* Chiov., *Melhania muricata* Balf. f., and *Sericocompositis pallida* Schinz in the Haud.

(3) *The Hydrosere*.—By large tugs having water at or near the surface throughout the year a number of hydrosereal communities may be distinguished. In pools are found *Algae* and *Characeae* such as *Chara vulgaris* L. On the moist sandy floors of tugs an annual vegetation consisting of seedlings of *Tamarix nilotica*\* and such herbs as *Sporobolus spicalus*, *Mollugo Cerviana* Seringe, *Gynandropsis gynandra* (L.) Briq., *Dactyloctenium aegyptium* Beauv., *Datura Metel* L., *Echinochloa colonum* Link, *Farselia longistyla* Bak., and *Ammannia baccifera* L. springs up. At the margins sand is fixed by grasses less than 1 m. high, of which the most important are *Panicum lurgidum*\*, *Pennisetum dichotomum* Delile and *Sporobolus robustus* Kunth; other plants such as *Indigofera articulata* Gouan, *Chrozophora oblongifolia* (Del.) A. Juss. and *Ricinus communis* L., spring up among the grasses; following these come tall reeds such as *Pergularia Daemia* (Forssk.) Chiov. var. *macrantha* Chiov., *Typha angustifolia* L., *Phragmites communis* Trin. and *Saccharum Ravennae* Murr. One of these species may form a pure associates, or two or three may form a consociates. These give way to thickets dominated by *Tamarix nilotica*\* in which grasses such as *Coelachyrum stoloniiferum* C. E. Hubbard, *Cenchrus setigerus* Vahl, *Sporobolus spicalus* and *S. robustus* form a ground flora; *Phoenix* sp. and *Suaeda fruticosa*\*, *Sesbania Sesban* (L.) Merrill, and *Cleome scaposa* DC. also occur.

These *Tamarix* thickets give way to a wood dominated by *Acacia spirocarpa*\*, *Salvadora persica*\*, *Ziziphus mauritiana*\*, and in which *Tamarindus indica* L.\*, *Ficus Sycomorus* L.\*, *Lawsonia inermis* L.\* and *Dobera glabra*\* also occur. This is followed by *Balanites*-bush *Acacia* scrub in which, besides the *Balanites orbicularis*\* and *Acacia* sp.? nr. *Bussei*\* (4172), *Balanites aegyptiaca*\* and *Acacia Senegal*\* occur.

A different course of events is followed where blown sand occurs. Here, after the pioneer grass stage, a scrub of *Muerna somalensis*\* and *Salvadora persica*\* is formed, with the grass *Eleusine flagellifera* Nees abundant in open places; this gives way to the *Acacia-Salvadora* wood. Where the earlier communities are opened up by grazing a grass community with abundant *Calotropis procera*\* is produced.

Beside tugs which are thoroughly dry for a large part of the year occur tree communities of *Ziziphus mauritiana*\*, *Acacia spirocarpa*\* and *Balanites aegyptiaca*\*, and less commonly *Ziziphus Hamur*\*, and the shrubs *Leptadenia Spartum*\* and *Acacia Senegal*\*.

(4) *Overgrazed Areas*.—Owing to the long dry season and the sporadicity of the rainfall, the *Commiphora*-bush *Acacia* formation is usually not heavily grazed throughout the year, and even after the rains some time must elapse before the Somalis can move their flocks and herds to the area affected. However, by large caravan routes and watering places, severe overgrazing takes place and here the shrubs may be eliminated and the herbaceous flora also much

reduced. In this way extensive bare areas are produced, superficially similar to the sub-desert. Grazed-down bushes of *Grewia tenax*\* especially near gullies, are usually the chief vestiges of the woody vegetation.

(5) *The Rhigozum scrub.* In the lowest parts of the *Commiphora* are other species of open scrub near Mount Elmis, and west of this a very much impoverished scrub occurs, in which *Rhigozum somalense*\* is dominant, and sometimes the only shrub present; the ground flora is also much reduced. Besides various members of the *Commiphora cuspidata*\* scrub a few plants were found here which were not seen elsewhere. These were: shrubs, *Caesalpinia* sp. and *Moringa aptera* Gaertn., and the herb *Convolvulus sericophyllus* Anders. This *Rhigozum* scrub might perhaps be treated as part of a distinct association within this formation, adapted to more xerophytic conditions than the other associations. The Binin was not seen east of Berbera, though *Caesalpinia* sp. (4489) and the *Moringa* occur here also.

(6) *The Commiphora erythraea*\*—*Acacia Asak*\*—*Croton open scrub.* On the lower north-facing slopes of the escarpment at altitudes of from 600–900 m. between the typical *Commiphora cuspidata*\* and shrub *Acacia* communities and the tree *Acacia* formation there occurs, especially on non-calcareous rocks, a special type of the *Commiphora* open scrub in which most of the species typical of the *Commiphora cuspidata*\* scrub are absent, the dominants being *Commiphora erythraea*\*, *Acacia Asak*\*, and *A. mellifera*\* among the shrubs, and *Croton Cliffordii* Hutch. & E. A. Bruce\* and *C. somalensis* Vatke & Pax among the lesser shrubs on eluvial ground, and *Acacia Senegal*\* on alluvial ground. The eluvial community is very similar to the xeroseral community of the *Acacia Bussei*\* open woodland association, but there are no signs that it gives way to tree *Acacia* open wood. *Commiphora crassispina* Sprague and *C. Opobalsamum* var. *induta* occur, and *Grewia tenax*\*, *Premna resinosa* and *Cadaba glandulosa*\* are common shrubs; not found lower down are *Euphorbia somalensis* Pax\* and *E. Robecchii* Pax, *Courbonia virgata* A. Brogn, *Grewia canescens* A. Rich., *Maerua crassifolia* Forssk., *Jatropha Phillipseae* Rendle and *Ochradenus baccatus* Del.; *Euphorbia scoparia* N.E.Br.\* is often abundant in river gorges. A common climber is *Psilotrichum gnaphalobryum* (Hochst.) Schinz; characteristic herbs are the grasses *Danthoniopsis barbata* C. E. Hubbard, *Enneapogon cenchroides* C. E. Hubbard, and *Sporobolus* sp. (4537), and the *Acanthaceae*, *Barleria Hochstetteri*, *B. acanthoides* forma (4436) and *Ecbolium Anisacanthus* (Schweinf.) C.B.Cl. Of the hydrosere, *Balanites aegyptiaca*\*, *Acacia spirocarpa*\* and *Lawsonia inermis*\* are typical. Over-grazing of *Commiphora erythraea*\*—*Acacia Asak*\* open scrub eliminates first the *Commiphora* and then the *Acacia*, forming a community with *Croton* as its only woody plant.



The *Commiphora erythraea*\*—*Acacia Asak*\*—*Croton* communities do not occur in river valleys, where the lowest part of the tree *Acacia* formation is the *A. Bussei*\* association. They are confined to mountain slopes, where they border on the *Acacia glaucophylla*\*—*A. etbaica*\*—*Terminalia Brownei* Fres.\* association of the tree *Acacia* formation.

The transition from *Commiphora* and other species of open scrub to the sub-desert. As has been said, the *Commiphora* open scrub is represented at its lowest limits on Mt. Elmis by a scrub in which *Rhigozum somalense*\* dominates. At the lower margins of this scrub the bushes are confined to broken ground and the beds of water courses, open patches of sub-desert appearing on level ground. In the scrub are patches where both *Rhigozum somalense*\* and *Caesalpinia* sp.\* (4489) are standing dead, apparently owing to drought, showing that the transition to the sub-desert is here a matter of climate and not of grazing. At Marmar, on the other hand, where *Rhigozum* scrub does not occur, the outlying *Commiphora cuspidata*\* and *Acacia Asak*\* bushes were found in water courses and stony ground, and at Elmis there is every evidence that grazing is intense and the presence of scattered *Iphiona rotundifolia*\* and *Cissus rotundifolia*\* within the borders of the sub-desert indicate that at least a portion of this is not climax but a grazing sub-climax to *Commiphora* open scrub.

*Economics*.—The *Commiphora*—bush *Acacia* formation yields various gums and resins of which Myrrh, from *Commiphora cuspidata*\*, and Gum Arabic, from *Acacia somalensis*\*, are the chief. It also provides temporary grazing for sheep, goats and camels.

### 3. TREE ACACIA OPEN WOODLAND.

The dominants are *Acacia* trees, sometimes adjacent to one another but usually well spaced. They are usually somewhat over 3 m. in height and have clear boles for 1 m. or more above the ground and rather flat umbrella-like crowns. They have a very extensive superficial root system so that although the trees are openly spaced there is a close network of roots a few centimetres below the ground. Beneath and between the trees is a carpet of grasses and dicotyledonous herbs, largely members of the *Acanthaceae*. These form a continuous layer except where, as often happens, they are overgrazed. Small shrubs are often present and perhaps succulents. Aloes are often abundant.

This formation seems to be the same as that described for the Buran district in eastern Somaliland by Collenette (31) and as the thorn scrub of the Sudan by Chipp (30), the thorn scrub belt stretching across West Africa south of the Sahara and the bush veldt of parts of the Transvaal and the Kalahari in South Africa.

It differs from the tree *Acacia* open woodlands of East Africa in that these are successional to deciduous scrub (Phillips (31) ), while this is climax.

The tree *Acacia* open woodland is the most extensive formation in the area visited ; it covers the western part of the Haud above 900 m., the Marar prairie, the Ogo plateau and the coastal mountains above 840 m., except their most well-watered portions.

*Environment.*—Weather records have been kept for some years at 5 places in this formation. The average rainfall over 10 years before 1932 at Sheikh and Hargeisa was 531 mm. and 478 mm. respectively ; at Buramo and Erigavo for 6 years before 1932, 620 mm. and 336 mm., and at Burao for 9 years till 1932, 247 mm. The greatest annual rainfall during this period was in 1926 when these stations had 796 mm., 810 mm., 706 mm., 465 mm. and 312 mm. respectively. The least annual rainfall were 297 mm. 315 mm., 406 mm., 267 mm. and 165 mm. There is a short dry period about July between the two rains and a longer winter dry period of 4-5 months when almost no rain falls at all.

This rainfall is insufficient to maintain permanently flowing streams, the watercourses (tugs) only carry water after storms.

The absolute annual temperature maxima range from about 31° C. at Erigavo (1,700 m.) to 35° C. at Burao (1,030 m.), the absolute annual minima from -2° C. at Erigavo to 17° C. at Burao. Frosts occasionally occur in all the stations except Burao. The highest mean monthly maximum ranges from 26° C. at Erigavo to 20° C. at Burao and the lowest mean monthly minimum from 9° C. at Erigavo to 17° C. at Burao.

Soils in this formation are buff, reddish-buff, grey or yellow loams, usually sandy. They are always alkaline or strongly alkaline (15 samples) with Ph. values of 7.5 to 8.5, even when derived from rocks poor in lime. However, in this formation, at least in its moister parts, the vegetation on limestone differs considerably from that on non-calcareous rocks.

Soil can develop here on moderate slopes as there is sufficient vegetation to retain it ; any steep slopes are, however, rocky. Salts seem to concentrate near the surface of the soil, the surface soil is found to have a higher Ph. value than that lower down, and in a great many places a hard calcareous crust which may be several centimetres thick (travertine) is formed a little below the surface of the soil.

*Communities within the tree Acacia open woodland.*—This formation is divided into three associations.

(1) The *Acacia Bussei*\* association on the lower parts of the Ogo plateau and in the Haud.

(2) The *Acacia etbaica* Schweinf.\*—*Euphorbia grandis* Lem.\* association on the more elevated parts of the Ogo plateau and the Marar prairie.

(3) The *Acacia glaucophylla* Steud.\*—*A. etbaica*\*—*Terminalia Brownei* Fres.\*—*Dracaena schizantha* Bak.\* association on the coastal mountains.

(1) *The Acacia Bussei*\* Association.—This widespread association seems to flourish under conditions of lower rainfall, higher temperatures and a more severe dry season than the other two *Acacia* open woodland associations. Burao is in this association and has a rainfall of 246 mm. per annum as against 531 mm., 521 mm. and 477 mm. for three stations in the *Acacia etbaica*\* association. An indication of the drier climate here is the absence of lichens which are common on the north side of trees in the *Acacia etbaica*\* association and in the *A. glaucophylla*\*—*Terminalia Brownei*\*—*Dracaena schizantha*\* association.

The climax community under the normal heavy grazing consists of *Acacia Bussei*\* trees from 3 to 8 m. in height, usually in small groups with intervals of as much as 40 m. between them. The superficial root system of the *Acacia* is very extensive; for instance one small individual 3.5 m. high was found to possess a root reaching, about 15 cm. below the surface, to a distance of 18 m. from the trunk. Thus rain falling in the spaces between the trees is utilised by them. The reason for the occurrence of the trees in groups is probably the difficulty of the seedlings becoming established except where some protection is provided from grazing. The branches of a fallen tree provide such protection in which a group of seedlings may often be seen springing up. These develop into one of the characteristic clumps of mature trees. A somewhat peculiar feature which becomes apparent in an air photo is that these clumps of trees, in the level plain of the Haud, all tend to be elongated, with their long axis pointing always in the same direction.

An area of 12,500 sq. metres of *Acacia Bussei*\* open woodland was found to be 20 per cent. shaded by trees and to contain 44 trees and big bushes, namely 32 *Acacia Bussei*\*, 1 *Acacia* nr. *subulata*\*, 10 *Boscia minimifolia* Chiov.\*, 1 *Maerua sessiliflora* Gilg\*, and about 30 small bushes, 10 young *A. Bussei*\*, 13 small *Boscia* and 4 young *Maerua sessiliflora*\*, and a few *Cadaba farinosa*\*.

Thus the density of wooded plants is about 1/40th of that in *Commiphora*—bush *Acacia* open scrub. The proportion of the area shaded was not significantly different, being in this case about 20 per cent.

The herbaceous vegetation consists of a fairly close cover of grasses with other plants subordinate, and 1 sq. metre of ground contained 78 grass plants and 9 other plants. Thus the density of herbs is here about 6 times that in the *Commiphora*—bush *Acacia* open scrub. The grasses and other herbs occurring in the shade of the trees differ from those in the open glades between the trees. In the former situation Acanthaceous and other herbs such as

*Justicia* sp. (4078), and another *Justicia* sp. (4079), *Lycium europaeum*, *Vernonia cinerascens*, and a few small semi-woody plants such as *Solanum obbiadense* Chiov. and chamaephytic grasses as *Chrysopogon Aucheri* var. *quinqueplumis*\* and *Tetrapogon villosus* Desf. prevail, while in the open glades are hemicryptophyte grasses such as *Cenchrus ciliaris* L. and *Sporobolus variegatus*\* often forming pure societies, with sometimes certain geophytes such as *Glossonema hispidum* Hutch. et E. A. Bruce. Frequently in a now open glade the former position of an *Acacia* is shown by a ring of *Chrysopogon Aucheri* var. *quinqueplumis*.\*

Besides the species already mentioned the following are also important in this association:—Trees, *Acacia spirocarpa*\*, *A. mellifera*\*, *Albizzia* sp.\* (4095), *Balanites glabra* Mildbr. and Schlecht.\*, undershrubs, *Grewia erythraea*, grasses, *Aristida adscensionis* L., *Sporobolus marginatus* Hochst., *Sporobolus* sp. (4096), *Tetrapogon tenellus* Chiov., *Cenchrus ciliaris* and other herbs, *Polygala obtusissima* Hochst., *Hibiscus somalensis* Franch., *Barleria diffusa* (Oliv.) Lindau, *Solanum carense* Dunal., *Ipomoea cicatricosa* Bak., *Commicarpus plumbagineus* (Cav.) Standl., *Hibiscus Hildebrandtii* Sprague and Hutch., *Ocimum tomentosum* Oliv., *Hydnora abyssinica* A. Braun., *Triplotaxis somalensis* (O. Hoffm.) Hutch., *Portulaca oleracea* L., *Becium knyanum* (Vatke) G. Tayl., *Thesium radicans* Hochst. ex A. Rich., *Justicia* sp. (4315), *Crotalaria dumosa* and *Zygophyllum simplex* L.

*Open Grassland*.—Open grassland occurs in two situations in the *Acacia Bussei*\* association, in slight depressions in the Haud, and on the edge of the Ogo plateau just south of the escarpment. *Chrysopogon Aucheri* var. *quinqueplumis*\* is the dominant grass in both places, in the Haud it may be almost pure, in the north other grasses such as *Paspalidium desertorum* Stapf and *Coelachyrum praeeflorum* Chiov. are of almost equal importance. The reasons for the existence of the Haud open grassland are probably somewhat as follows.

The depression in which the open grassland occurs being rather moist, a dense growth of grass is possible; since there is no permanent water in the vicinity grazing is not sufficiently intense always to keep the grass down, and fires sometimes occur. These kill young trees and damage old ones. The grazing here is unusually good owing to the higher water content and accordingly a large number of Somali Kurias (nomadic parties) are attracted to the area whenever temporary rainwater pools make it possible to get water anywhere near. The Somalis destroy trees for at least five different reasons. Their camels and goats graze on them (this is especially severe on the young trees which are within reach of the goats), they lop off branches to provide grazing for the goats when the grass is dry, they need a large number of these tree branches for Zarebas which, being eaten by termites, have constantly to be renewed, and they strip the bark to make rope, mats, and other

articles, thus frequently killing trees. In a wooded area this destruction of trees is comparatively unimportant, resulting merely in open patches around large Zarebas, but where an open plain has been produced these destructive influences are intensified since the Somalis supported by the entire plain concentrate on the isolated *Acacia* trees which spring up in the plain, and on the trees at the edge of the plain. Thus an unusually large water supply produces, not, as might be expected, a more luxuriant growth of trees, but their suppression. The same general explanation holds for the open grassland on the edge of the escarpment except that since grazing is always too heavy, fire here plays no great part. The extra showers which this area gets keep the grass fresh for much longer than is usual. An unusual number of Somali Kurias are attracted to the neighbourhood and the trees suffer accordingly.

*Acacia Bussei* Association : Sand Communities.—On Nubian sandstone where the soil consists largely of loose sand the bush *Acacia* (*A. Sieberiana*\*) is dominant as a shrub below the trees *A. Bussei*\* and *A. spirocarpa*\*. *Aloe trichosantha* Berger\* and *Croton Cliffordii*\* or *C. somalensis* Vatke and Pax are also abundant in this community. *Grewia tenax*\* and *Maerua sessiliflora*\* also occur, and *Solanum* sp. (4279). It is noteworthy that here the tree *Acacias* show no grove-glade arrangement, but are rather evenly spaced. This may be due to the protection afforded to young trees by the *Acacia Sieberiana*\* bushes, which means that no one part of the community is especially favourable for their growth.

*Acacia Bussei*\* Association : the Xerosere.—As might be expected the xerosere of the *Acacia Bussei*\* Association approaches in some ways the climax community of the *Commiphora*—bush *Acacia* open scrub formation. The chief trees are *Acacias*, *A. Bussei*, *A. Senegal*\*, and *A. mellifera*\*, which are found in both the Haud and the North, and *Delonix elata*\*, *Commiphora lughensis* Chiov.\*, *C. ogadensis* Chiov.\*, *Sterculia Rivae* Chiov.\* and *Cadaba heterotricha* Stocks.\*, which are only found in the north, where the xerosere is much better developed owing to the more broken nature of the country. Among bushes in both the Haud and the North occurs *Grewia tenax*\*, in the Haud occur also *Commiphora Gowello*, *C. candidula* Sprague, *C. linearifolia* Chiov. and *Acacia elbaica*\*, while in the north *Grewia mollis* Juss.\*, *G. Schweinfurthii* Burret\*, *Euphorbia infausta* N.E. Br.\*, *Aloe Rivae* Baker\*, *Senecio longiflorus* (DC.) O. and H., *Senecio longiflorus* var. *violascens* (A. Berg.), *Sarcostemma viminalis* R. Br.\*, *Croton Cliffordii*\* or *C. somalensis*, and on limestone *Periploca ephedriiformis* (Defl.) Schweinf. are found. Characteristic herbs in the north are *Caralluma speciosa* N.E. Br.\*, *Sansevieria Ehrenbergii*, *Aloe trichosantha*\* and in the Haud the grass *Andropogon cyrtocladus*\* which is locally dominant. This grass, which is large and bushy, has most probably been almost entirely grazed out in the north, thus making room for an increase in the *Aloes*, etc., but

survives in the Haud where, owing to the absence of permanent water grazing is less severe.

It is a curious fact that in the xerosere of the *Acacia Bussei*\* association in the Haud the *Commiphorae* are all undersized, rarely reaching 2 m. in height, whereas in the xerosere of this association in the north the *Commiphorae* reach a size unknown elsewhere; thus individuals of *C. lughensis*\* reach 6 m. in height and have trunks with a circumference of 1.5 m., while *C. ogadensis*\* trees reach 5 m. in height and a circumference of .7 m. These large *Commiphorae* in the north occur on steep rocky slopes and cliffs such as do not occur in the Haud, while the stunted *Commiphorae* of Haud occur on almost level stony ground, on which *Commiphorae* do not occur in the north, probably being grazed out. Probably some of the stony mountain sides in the north may get an unusually high amount of rain through catching moisture-laden winds from the Gulf of Aden, and their vegetation, containing large tree *Commiphorae*, then represents not so much the xerosere of the *Acacia Bussei*\* association as a transition towards deciduous scrub.

*Acacia Bussei*\* Association : *Hydrosere*.—The hydrosereal communities in this association are intermediate between those in the *Acacia etbaica*\* association and those in the *Commiphora*—bush *Acacia* formation. The usual pioneer and binding grasses are followed, where there is permanent moisture, by *Typha angustifolia*, *Saccharum Ravennae*, and reed beds with *Phoenix* species. Tamarisk is not very important. The next stage is a *Ziziphus-Acacia spirocarpa*\* wood which is distinguished from that in the *Acacia etbaica*\* association by the presence of the trees *Lawsonia inermis*\*, *Ficus Sycomorus*\*, *Tamarindus indica*\* and the liane *Cissus quadrangularis*\*, while the more open community which follows contains, besides the *Euphorbia nubica*\* and *Aloe abyssinica* Lam.\* characteristic of this stage in the hydrosere of the *Acacia etbaica*\* association, evergreen thickets of *Salvadora persica*\* and *Dobera glabra*\*, abundant *Sansevieria Ehrenbergii*\* and *Aloe trichosantha*\* among the succulents and *Berchemia discolor* Hemsl.\*, *Balanites aegyptiaca*\*, *Cordia ovalis* R. Br.\* and *Turraea parvifolia* Defflers\* among the trees and shrubs.

(2) *The Acacia etbaica*\* Association.—This association is very widespread on the upper parts of the Ogo plateau, mostly above about 4,400 feet.

It contains the following communities:—

- (1) The grazing sub-climax open woodland.
- (2) Hydrosereal communities.
- (3) Xerosereal communities.
- (4) Open grass plains (fire sub-climax).

*Climax (grazing sub-climax) community*.—The dominant tree (*Acacia etbaica*\*) retains its leaves until far into the dry season so that in this respect it is contrasted with the *Acacia Bussei*\* whose leaves fall off much earlier. On account of the persistence of its

foliage the *Acacia* is much lopped to obtain fodder for stock, and as it responds to this treatment by sending up shoots from ground level the community often comes to consist of bushes rather than trees. The only other important tree is *Euphorbia grandis*\*, which may be co-dominant on non-calcareous rocks. *Acacia* nr. *subalata*\* (3948), *Balanites glabra*\* and *Maerua sessiliflora*\* also occur and among the shrubs *Cadaba farinosa*\* and *Euphorbia nubica*\*. Abundant everywhere and sometimes forming close sheets on deeper soil is the 1 m. high *Aloe abyssinica*\*. *Cissus rotundifolia*\* is frequent.

Among the grasses which are always closely grazed *Tetrapogon villosus*, *Chrysopogon Aucheri* var. *quinqueplumis*\*, *Eragrostis aulacosperma* Steud. and *Rhynchelytrum villosum* Chiov. are important. Succulents are *Caralluma speciosa* N.E. Br., *Euphorbia turbiniformis* Chiov., *Caralluma Dicapuae* (Chiov.) Chiov., and *Ceropegia* sp. (4234). A great number of dicotyledonous herbs and shrublets under  $\frac{1}{2}$  m. occur among the grass; of these the Acanthaceae, *Hypoestes Hildebrandtii*\*, *Blepharis fruticulosa* C.B. Cl., *B. edulis* and *Barleria proxima* Lindau are especially prominent; also *Ipomoea cicatricosa*, *Vaupelia heliocharis* (S. Moore) Brand., *Boerhaavia reniformis* Chiov., *Lasiosiphon somalensis* Pearson, *Orthosiphon tenuiflorus* Benth., and *Vernonia cinerascens*. Other herbs are *Barleria parviflora* R. Br. ex T. Anders., *Bouchea sessilifolia* Vatke, *Barleria quadrispina* Lindau, *Lasiosiphon somalensis* var. *glabra* Pearson, *Helichrysom somalense* Bak. f., *Cienfuegosia Welshii* (T. Anders.) Garcke, *Tephrosia simplicifolia* Franch., and *Helichrysom glumaceum* DC.

*The Acacia etbaica*\* Association: *Hydrosere*.—No permanently wet tugs or pools have been observed in this association. Beside temporary tugs, grasses such as *Panicum turgidum* Forssk., *Aristida adscensionis* L. and *Cymbopogon floccosus* Stapf bind the sand. These are followed by a close wood about 8 m. high, of *Acacia spirocarpa*\* with occasional large trees of *Zizyphus mauritiana*\*. This *Acacia spirocarpa*\* woodland consists of much finer trees than those in the climax community. An average specimen of the *Acacia* has a trunk 2.3 m. in circumference 1 m. above ground level, and reaches 8 or 9 m. in height, while the *Zizyphus* trees which occur scattered among the *Acacias* reach 20 m. in height. This in turn gives place to an *Acacia*—*Euphorbia nubica*\* open woodland of *Acacia spirocarpa*\*, *A. Bussei*\*, *Acacia* nr. *subalata*\* (3948), *A. senegal*\* and *A. etbaica*\*, and of *Balanites glabra*\*, amongst which is a dense growth of *Euphorbia nubica*\*, *Aloe abyssinica*\* and other bushes. Where the ground is liable to be water-logged a different succession is followed and a turf of short grasses, such as *Cynodon Dactylon* Pers., is produced under the normal heavy grazing. An example of this near Buramo has been protected for some dozen years from heavy grazing as a Government grazing reserve and here the short grasses are replaced

by others up to 1.8 m. high, in the shelter of which a mixture of *Ziziphus mauritiana*\* wood, and post-climax *Acokanthera Schimperi* Schweinf.\* scrub, seems to be developing.

In the *Ziziphus mauritiana*\*—*Acacia spirocarpa*\* wood, the chief creepers are *Commicarpus plumbagineus* and *Cissus rotundifolia*\*. Species of *Loranthus* are often abundant. Beneath the trees is a rank mesophytic herbaceous vegetation including *Leucas urticifolia* R. Br., *Hypoestes Hildebrandtii*\*, *Boerhaavia diffusa* Lam., *Panicum maximum* Jacq., *Urochloa panicoides* Beauv., *Chloris virgata* Sw., *Setaria verticillata* Beauv., *Chloris pycnothrix* Trin., *Commelina albescens*, *C. Forskalaei* Vahl., *Hibiscus calycinus* Willd., *Crotalaria laxa* Franch., *Wedelia abyssinica* Vatke, *Abitilon ramosum* Guill. and Perr., *Justicia flava* Vahl., *Sida rhombifolia* L., *Ocimum suave* Willd., *Leucas Jamesii* Bak., *Acalypha fruticosa* Forssk., *Dicliptera verticillata* (Forssk.) Nees, *Monechma debile* (Forssk.) Nees, *Verbena officinalis* L.

In the *Acacia*—*Euphorbia nubica*\* open woodland, which succeeds the *Ziziphus mauritiana*—*Acacia spirocarpa*\* wood, occur the following shrubs:—*Solanum incanum* L., *Grewia mollis* Juss., *Cadaba farinosa* Forssk.\*, *Grewia tenax*\*, *Ehretia obtusifolia* Hochst., *Grewia villosa* Willd., *Sarcostemma viminalis*, *Ceropegia De Veehii* Chiov., and a great variety of herbs such as *Solanum carense*, *Dactyloctenium aegyptium* Boiss., *Commicarpus plumbagineus*, *Vernonia amplexicaulis* Baker, *Ocimum americanum* Baker, *Eragrostis aulacosperma*, *Sporobolus marginatus*, *Tragus racemosus* All., *Aerva tomentosa* Forssk., *Diceratella sinuata* (Franch.) Oliv., *Cyphocarpa pallida* C.B. Cl., *Hibiscus Hildebrandtii*, *Ochradenus somalensis* Bak., *Pergularia Daemia*, *Ipomoea obscura* Ker., *Nidorella pedunculata* O. and H., *Salsola Bollae* Boiss., *Pentatropis cynanchoides*, *Sansevieria abyssinica* N.E. Br., *Ruellia discifolia* Oliv., *Justicia aridicola* Rendle, *Pupalia lappacea* Juss., *Cynanchum sarcostemmatoides* K. Sch., *Cucumis dipsaceus* Ehrenb., *Ruellia patula* Jacq., *Ecbolium Anisacanthus*, *Indigofera intricata*, *Ochradenus somalensis*, *Crotalaria albicaulis* Franch., *Melothria* sp. (3962), and *Tragia brevipes* Pax.

Typical of the trees and bushes in these two hydrosere communities are long tap roots which penetrate to underground water. Thus a small individual of *Euphorbia nubica*\* was noticed with a tap root 2.5 cm. in diameter 4 m. below ground level, while a specimen of *Ziziphus mauritiana*\* of under medium size was noticed with roots 6 cm. in diameter 7 m. below ground level. *Acacia spirocarpa*\* also differs from most of the *Acacias* whose roots were examined in having, besides the usual long spreading horizontal roots just below ground level, a strong central tap root. A small individual of this species had a tap root 6 cm. in diameter 3 m. below ground level.

*The Acacia etbaica*\* Association: Communities in the xerosere. The xerosere of the *Acacia etbaica*\* open wood may be not very different from the climax community but succulents are



often much more abundant, for instance *Caralluma speciosa* and *Senecio longiflorus*\* and *S. longiflorus* var. *violascens* A. Berg. (chiefly on non-calcareous soil). *Aloe somaliensis* C. H. Wright\*, *A. trichosantha*\*, *A. abyssinica*\*, *Acacia Senegal*\* and *A. Bussei*\* are frequent. The small bushes *Croton Cliffordii*\* or *C. somalensis* and *Grewia Schweinfurthii*\* are also often abundant.

In loose sand, which is rare in this association, *Acacia Sieberiana*\* occurs.

*The Acacia etbaica*\* Association: *Open plains*.—In this association is the large open grass tract known as the Marar prairie. Here the soil is deep, the rainfall good, and owing to the lack of permanent water for drinking grazing is less intense than usual. As a result the grass is allowed to grow tall and grass fires occur (observed, February, 1933, and by Burton in 1854), and woody vegetation and Aloes are destroyed. It seems probable that with the advent of more settled conditions and a consequent increase in grazing and diminution in fires *Acacia etbaica*\* is now encroaching upon this plain, at any rate in its most northern part. Patches of *A. etbaica*\* may also be seen wherever any broken ground reduces the intensity of the fires.

(3) *The Acacia glaucophylla*\*—*A. etbaica*\*—*Terminalia Brownei*\*—*Dracaena schizantha*\* Association.

This association occupies the northern slopes of the coastal mountains above the *Commiphora*—bush *Acacia* open scrub where these are not occupied by evergreen scrub or *Juniperus* forest. The association is less prominent on limestone than on non-calcareous rocks owing to the better growth of the evergreen *Buxus* and of *Commiphorae* on the limestone. Where it does occur on limestone the association is represented by a very handsome *Acacia glaucophylla* Steud.\*—*A. spirocarpa*\*—*Dracaena schizantha*\* open wood, the *Dracaenae* being fine spreading trees 10 m. high. On other rocks the dominants are *Acacia glaucophylla*\*, *A. etbaica*\*, *A. nilotica* Del.\* and *Terminalia Brownei*\*. Besides these trees other bushes are scarce, though *Commiphora tubuk* occurs, and in the xerosere *Peucedanum fraxinifolium* Hiern\* on non-calcareous rocks, *Ficus populifolia* Vahl.\*, *Combretum tricanthum* Fres.\* and (on limestone) *Periploca ephedriiformis*. In the hydrosere occur especially *Acacia spirocarpa*\*, *Balanites aegyptiaca*\* and *Grewia mollis*\*. The absence of Aloes from this association is noteworthy. Among the grasses *Chrysopogon Aucheri* var. *quinqueplumis*\*, *Tricholaena setacea* C. E. Hubbard, *T. Gillettii* C. E. Hubbard and *Hyparrhenia hirta* Stapf are prominent. Some of the other herbs found here are *Hypoestes Hildebrandtii*\*, *Selaginella rupestris* Spring on non-calcareous rocks, the *Tiliaceae*, *Triumfetta trigona* Hutch. & Sprague and *T. flavescens* Hochst. which are especially characteristic, *Indigofera oblongifolia* Forssk., *Asystasia Coleae* Rolfe, *Dorstenia foetida* (Forssk.) Schweinf. & Engl., *Lindenbergia sinaica* Benth.,

*Polygala abyssinica* Fres., *Chascanum africanus* Moldenke, *Stylosanthes flavicans* Baker, *Linaria hastata* R. Br., *Pulicaria petiolaris* Jaub. & Spach, *Polygala erioptera* DC., *Pentanisia ouranogyne* S. Moore, *Oxygonum aliplicifolium* Martelli var. *sinuatum* Baker, *Pavonia Kotschyi* Hochst., *Melhania Denhami* R. Br., and *M. rotundata* Hochst.

In this association the Acacias retain their foliage until well into the dry season, if not throughout the year. The lower part of the association, which adjoins *Commiphora erythraea*\*—*Acacia Asak* open scrub, usually has abundant small shrubs such as *Croton Cliffordii*\* or *C. somalensis* and tall woody herbs such as *Triumfetta* and various *Labiatae* and *Malvaceae*. Above, where it adjoins evergreen scrub or Juniper forest, these shrublets are wanting and there is an open sward beneath the Acacias. This latter part may in reality be a grazing sub-climax to the evergreen scrub.

*The effects of grazing upon the tree Acacia open woodland.*—The whole formation is more or less closely grazed and the results of this can be seen in the scarcity of non-thorny trees and shrubs, in the way in which those that do exist are grazed down to a close compact mass, in the frequent patches bare of grass and the abundance of inedible plants such as *Euphorbia nubica*\*, *Aloe abyssinica*\* and *Cissus rotundifolia*\*. In parts of the Haud, owing to the absence of permanent drinking water for the stock, grazing is much less intense and this fact probably accounts for the abundance of the tall *Andropogon cyrtocladus*\* in the Haud, and of small *Commiphorae* and the absence of Aloes and *Sansevieria* which are eliminated by the competition of the grasses.

The problem of what would happen if grazing were eliminated or very much reduced depends on whether or not fires were permitted. In the former case one would expect a great extension of open grass plains. In the latter, parts of the *Acacia etbaica*\* association would probably develop towards evergreen scrub, the species of the latter formation being able to establish themselves in a dense grass cover. Elsewhere in the formation there would probably be a wide development of various small shrubs between the trees.

*Transition from the tree Acacia open woodland to Commiphora—bush Acacia open scrub.*

As the boundary between the two formations is approached species of the open scrub appear in the xerosere of the tree *Acacia* formation. Where the ground is broken the open scrub appears first on south-facing slopes. On level ground isolated dead *Acacia Bussei*\* trees, or whole patches of them, appear. These have probably been killed by drought; the rainfall occurs as thunder-showers and as these cover small well-defined tracts small areas

may get very much less than the usual rainfall if they happen to have been missed by the storms. The *Commiphorae* seem unable to establish themselves under the shade of the Acacias but can do so where the Acacias have been killed. The instability of the *Acacia Bussei*\* open woodland near its lower limit is shown by an occurrence at Burao, where an area of open woodland having been cleared for military purposes it was found that the South-West Monsoon, the "Kharif", whipped up sand and dust storms in the open area which destroyed the open woodland to the North-East, thus continually extending the bare area.

*Economics of the Formation.*—The whole formation provides grazing for sheep, goats and camels. The *Acacia etbaica*\* and the *Acacia glaucophylla*\*—*Terminalia Brownei*\* association also provide grazing for cattle. On alluvial tracts in the *Acacia etbaica*\* association occur the only agricultural areas in British Somaliland, the crops being sorghum, maize and grain. The formation produces gum arabic from *Acacia Senegal*\* and *A. Bussei*\*, and were the demand sufficient, most of the *Acacia* association could be converted into an *Acacia Senegal*\* plantation by broadcasting the seed, giving a few years' protection from grazing to allow the establishment of the seedlings, and killing the competing *Acacia Bussei*\* and *A. mellifera*\*.

Two of the dominants in the formation, *Acacia Bussei*\* and *Terminalia Brownei*\*, produce barks used for tanning, but these may be of little economic importance. *Sansevieria Ehrenbergii*\* and *S. guineensis*, which are abundant (especially the former) in the *Acacia Bussei*\* association on alluvium, yield fibres of economic importance, and alluvial tracts in this association could be converted into plantations of these species were the demand for the product sufficiently great.

In the *Acacia Bussei*\* association, more especially on caravan routes, the conservation of trees is of economic importance, as these protect the grazing and prevent dust. The government therefore issues edicts against the cutting of trees for fodder in times of drought and for Zarebas. In many parts of the formation, especially in the *Acacia etbaica*\* association, the destruction of the herbaceous vegetation by over-grazing is now leading to serious soil erosion and consequent deterioration of the grazing. Though the destruction of land suitable for agriculture and the gravity of the damage done is realised, no measures of control, whether by reducing the number of stock or giving the grazing areas periodic rests, are being put into practice. Any such remedial measures are made difficult by the lack of education among the Somalis, their mistrust of an alien government, their unwillingness to sell stock owing to the low prices obtained and excessive charges by middlemen, and the lack of money for fencing.

In a great part of the tree *Acacia* formation the value of the grazing is much reduced by the abundance of *Aloe abyssinica*\*; such is the case for example around Buramo and Hargeisa. Since this plant is quite inedible, and nothing else can grow on the ground it occupies, it may reduce the grazing value of a piece of land considerably. It could probably be removed by the following practice, which in other ways would benefit the land. The area would be protected from grazing for some years and the grass allowed to grow tall, where this did not occur readily owing to the tall-growing grasses having been eliminated by continual intense grazing they should be sown. The tall grass would then be fired once, or more often, which would kill off the Aloes and the area would then once more be made open to grazing.

#### 4. DECIDUOUS SCRUB FORMATION.

*Description.*—Small deciduous trees about 3 or 4 m. high, belonging largely to the genera *Acacia*, *Combretum*, *Terminalia* and *Commiphora* are crowded fairly closely together with bushes filling in gaps so that the community is often difficult to walk through. On the ground a fairly dense herbaceous covering is found, in which dense aspect societies of *Acanthaceae*, *Amaranthaceae*, etc., play a large part. It most resembles the tree *Acacia* open woodland, but differs from it in its much greater density and greater richness in species. From the *Commiphora*-bush *Acacia* open scrub it differs in its density and in that the dominants are trees rather than shrubs, while the ground vegetation is continuous and not tufted.

This deciduous scrub seems to be the same formation as that described by Phillips (31) for the central province of Tanganyika territory.

*Area.*—To the south and south east of Harar at 1200–1500 m.

*Habitat.*—No meteorological data are available. It would seem likely that the rainfall is rather higher than in the tree *Acacia* open wood formation, probably about 560 mm. per annum, the average temperature slightly greater and the minimum higher, certainly never falling towards freezing point. Probably the most important factor distinguishing the climate of this formation from that of the tree *Acacia* open woodland is the shorter length of the dry season. The rainfall is insufficient to supply permanent rivers, and those streams which, rising higher up in the evergreen forest formation, run down into this formation, gradually peter out. A soil sample from near the upper limit of this formation (1440 m.) on granite, had a  $P_{H_2}$  of 7.5 and .494 per cent. organic matter.

This formation was not examined at all closely as it was merely hurriedly visited towards the end of the dry season (February) when but few of its plants were in flower. Some of the chief trees and shrubs are, *Dichrostachys glomerata* (Forssk.) Chiov., *Acacia*

*pennata* Willd., *A. Seyal* Del., *Capparis tomentosa* Lam., *C. Rothii* Oliv., *Combretum collinum* Fres., *Terminalia Brownei*\*, *Commiphora resiniflua*; others are, *Cissus quadrangularis*\*, *Sterculia Rivaie* Chiov., *Peucedanum fraxinifolium* Hiern, *Acacia spirocarpa*\*, *A. Senegal*\*, *Cadaba farinosa*, *Oncoba spinosa* Forssk., *Ximenia americana* L., *Gardenia lutea* Fres., *Pavetta gardeniifolia* Hochst. ex A. Rich., *Maerua Hoehnelii* Schweinf. and *Balanites glabra*. Among the herbs was the scarlet-flowered composite, *Nolonia coccinea* O. & H.

*Hydrosere*.—On the banks of streams are found groves or woods of tree *Acacias* and, in places, thickets of *Tamarix* sp.

*Economics*.—Agriculture is practised and in conjunction with it the grazing of cattle and goats. Camels are not important. The cultivated ground is not confined to alluvial tracts but is also on gentle slopes. Where there is permanent running water sugar-cane is grown.

### 5. EVERGREEN SCRUB FORMATION.

The climax community on mature deep soils is rarely or never found owing to the prevalence of agriculture in this formation. It seems that it would consist of a closed scrub of evergreen or almost evergreen shrubs, small trees and climbers with occasional larger trees. The shrubs are usually thornless and their leathery glossy leaves seem to be very frequently poisonous or distasteful to stock. The shade cast, while fairly deep in places, is much interrupted. Epiphytes other than crustose lichens do not occur. Continuous soils develop even on quite steep slopes. Grass grows densely where the bushes are removed but does not form a regular turf.

The *Buxus* community described by Collenette on the Al Hills in Eastern Somaliland belongs to this formation. It seems also to be the "Gebirgs busch" of Engler.

*Area*.—The formation occupies a fairly extensive zone in the Harar district, between the evergreen forest above about 6,500 feet and the tree *Acacia* open woodland or deciduous scrub below about 5,000 feet. In Somaliland only the xerosere is represented, in the most well-watered parts of the escarpment above about 3,700 feet, where it occurs in fairly small patches.

*Environment*.—There are no meteorological records for the evergreen scrub formation in Somaliland. It is certain, however, that it gets a certain number of showers in the dry season, and also heavy mists and dew. In Abyssinia there are certain data for Harar, which is in this formation. There are two rainy seasons, one with a maximum in April-May and a second with a maximum in July-August. There is no month quite without rain but less than 1 in. per month from October to February. The total annual rainfall is about 33 ins. Permanent streams occur but seem to get

most of their water from the more humid evergreen forest formation above.

The soils are brown, red or black loams. Even when derived limestone they may be sufficiently leached to be poor in lime and approaching neutrality. Organic carbon contents of 0.492 per cent. in an agricultural soil and 2.01 per cent. and 2.49 per cent. in native soils were found. On soils derived from limestone Ph. values ranged from 7 to 8, on those from non-calcareous rock 6.2 and 6.6 were found. It seems that this formation marks the zone above which leaching and below which evaporation predominate in their effects upon the soil.

*Communities within the evergreen scrub formation.*—In Somaliland four different types of xeroseral communities are found, their differences depending on the nature of the underlying rock and on altitude. The climax community does not occur in Somaliland owing to a lack of suitable situations. In the Harar district conditions are suitable for the development of the climax but it has been destroyed by agriculture and the search for firewood. The evergreen scrub around Harar is treated as a whole as sufficient time was not available to work out the various communities within it.

The communities to be described are then; in Somaliland (1) *Buxus-Acokanthera* scrub on lava rock below about 4,200 ft.; (2) *Acokanthera* scrub on non-calcareous rocks from about 4,200 ft.—5,700 ft. with *Euphorbia abyssinica*\*; (3) *Buxus-Commiphora* scrub with *Mimusops Kummel* Hochst. on limestone below 4,700 ft.; (4) *Buxus-Juniperus*, etc., scrub on limestone 4,700 ft.—5,700 ft.; (5) around Harar, the evergreen scrub as a whole.

(1) *Buxus-Acokanthera* scrub on non-calcareous rock below 4,400 ft. This was seen best at Duwi pass, 10° 5' N. by 44° 15' E. on basaltic lava. The dominants are *Buxus Hildebrandtii* Baill.\* and *Acokanthera Schimper*i Schweinf.\* *Buxus* is the only member of the scrub in its lowest parts in ravines at 2,800 ft., *Acokanthera* commences at 3,700 ft. and is dominant in the southern margin of the scrub.

Scattered trees are *Cussonia Holstii* Harms and *Ficus vasta* Forssk.\* and *F. populifolia*. Also *Dracaena schizantha*\* on rocks. Large shrubs, besides the dominants, are *Gymnosporia luteola* (Del.) Loesn., *Teclea pilosa* (Engl.) Verdoorn, *Rhus natalensis* Bernh., *Tarenna graveolens* (S. Moore) Bremck., *Pavetta gardeniifolia*, *Fluggea virosa* Baill., *Canthium bogosensis* Hutch. & E. A. Bruce\* (*Plectronia bogosensis* Mart.), the evergreen *Commiphora Playfairii*, *Maerua sphaerogyna* Gilg & Benedict, *Euclea Kellau* Hochst. and *Grewia tembensis* Fresen. Smaller shrubs are *Coleus* sp. (4403), *Cadia purpurca* Ait., *Clerodendrum myricoides* R. Br., *Jasminum Steudneri* Schweinf., *Azima tetracantha* Lam., *Trematosperma cordatum* Urb., *Psidium arabica* Jaub. & Spach; these

mostly occupy spaces between the large shrubs, but do not form a layer beneath them. Climbers are two species of *Asparagus* and *Vigna nilotica* Hook. f., *Tragia arabica* Baill. var. *parvifolia* Prain, *Cissus Schweinfurthii* Planch., *Vigna* sp. (4429). These are not abundant in individuals, except *Cissus Schweinfurthii*. Among the herbs of the *Buxus-Acokanthera* scrub are *Haemanthus abyssinicus*, *Cheilanthes coriacea* Decne, *Actinopterys australis* (L. f.) Link, *Crassula galunkensis* Engl., species of moss, *Selaginella rupestris* and *Commelina benghalensis* Linn.

(2) *Acokanthera* scrub on non-calcareous rocks.—The general features are much the same as for the *Buxus-Acokanthera* scrub but the species are largely different. *Buxus* is subordinate or absent, *Acokanthera Schimperi*\* is everywhere dominant. Other trees and large bushes are *Euphorbia abyssinica* (*E. grandis*), *Olea somalensis* Baker\*, *Gymnosporia luteola*, *Ficus populifolia*\*, *Pappea Radlkoferi* Schweinf.\* Smaller shrubs are *Azima tetracantha*, *Cadia purpurea*, *Euphorbia nubica*\* and *Dodonaea viscosa* Linn.\* Climbers are *Asparagus* sp. and *Senecio subscandens* Hochst., and herbs are much the same as in the *Buxus-Acokanthera* scrub.

(3) *Buxus-Commiphora* scrub with *Mimusops Kummel*\*.—This is a much more open scrub than those previously considered and between the evergreen trees and bushes are numerous deciduous ones, and a high proportion of succulents. The community was seen on the limestone Libah Heleh range, 10° 20' N. by 43° E. where it is fairly extensive.

Dominants are *Buxus Hildebrandtii*\* and *Commiphora lughensis*\*. Other common trees and shrubs are *Dracaena schizantha*\*, *Commiphora ogadensis*\*, *Lannea malifolia* (Chiov.) Hutch. & E. A. Bruce (*Ocina malifolia* Chiov.), *Pappea Radlkoferi*\*, *Olea chrysophylla* Lamk.\*, *Sterculia Rivaie*, *Grewia tembensis*, *Canthium bogosensis*\* (*Plectronia bogosensis*), *Combretum tricanthum* Fres., and at intervals of a few hundred metres occur large "Anjel" trees, *Mimusops Kummel*.

Among the small shrubs which occur between the larger ones *Euphorbia infausta*\*, *Croton Cliffordii*\* and *Grewia Schweinfurthii*\* are abundant and *Periploca ephedriiformis*, *Dodonaea viscosa*\*, *Aloe Rivaie*\*, and *A. abyssinica*\* and *Adenia venecata*\* are frequent. *Sansevieria abyssinica*\*, *Aloe somalensis*\* and *Haemanthus abyssinicus* also occur here. The relationships of this community are obscure; it seems to pass in places into *Commiphora erythraea*\* open scrub, elsewhere patches, apparently relict, of *Acacia Bussei*\* open woodland are found in it, and, in yet other parts, patches of the *Acacia glaucophylla*\*—*Acacia etbaica*\* open woodland. The rocky soil on which it grows would lead to its being included in a xerosere but it seems impossible to suggest what it leads up to.

(4) *Buxus-Juniperus* scrub.—This type of scrub occurs on the Libah Heleh between 4,700 ft. and about 5,700 ft. In it a succession from *Buxus* scrub to *Juniperus* forest appears to be

taking place, which is periodically checked, probably by droughts. A large number of dead Junipers were seen which may have been killed by the drought of 1927-28. In its more developed upper parts it approaches a low forest, while below it may be quite open. In it are found a larger number of bushes and trees than in any of the other evergreen scrub communities.

The trees in approximate order of importance are *Juniperus procera* Hochst.\*, *Olea chrysophylla*\*, *Sideroxylon Gillettii* Hutch. & E. A. Bruce\*, *Pappaea Radlkoferi*\*, *Lannea malifolia* Hutch. & E. A. Bruce\* (*Odina malifolia* Chiov.), *Pistacia falcata* Becc.\*, *Ficus populifolia* Vahl\*, *F. vasta* Forssk.\*, *Dracaena schizantha*\* and *Euphorbia grandis*\* (*E. abyssinica*), the last three being scarce. The *Ficus* spp. are chiefly found on limestone. The absence of *Mimusops Kummel*\* and *Cussonia Holstii* is noteworthy.

The bushes and small trees in approximate order of importance are *Buxus Hildebrandtii*\*, *Gymnosporia luteola*, *Euclea Kellau*, *Grewia tembensis*, *Acokanthera Schimperii*\*, *Canthium bogosensis*\* (*Plectronia bogosensis*), *Ziziphus mucronata* Willd.\*, *Teclea nobilis* Del., *Ficus glumosa* Del., *Jasminum Steudneri* Schweinf., *Pistacea Lentiscus* var. *emarginata* L., *Heeria insignis* (Del.) O. Kuntze, *Ficus salicifolia* Vahl, *Carissa edulis* Vahl, *C. edulis* var. *tomentosa* Stapf, *Sageretia spiciflora* (A. Rich.) Chiov., *Commiphora Playfairii*, *Maerua sphacrogyna*, *Tarchonanthus camphoratus* L., *Rhus retinorrhoea* Steud. and *Fagara chalybea* Engl. Climbers are *Asparagus* sp. and *Rhoicissus Revoilii* Planch.

Small shrubs are in order of importance, *Cadia purpurea* Ait.\*, *Dodonaea viscosa*\*, *Euphorbia infausta*\*, *Ephedra* Alle C. A. Meyer, *Periploca ephedraformis*, *Coleus* sp., *Ballota fruticosa* Baker, *Euryops pinifolia* A. Rich., *Lasiosiphon somalensis*, and *Osyris abyssinica* Hochst.

*A dry open form of evergreen scrub.*—This community occurs above about 5,600 ft. on the south side of the Libah Heleh range and on the Darabileh range to the south of this, in each case on limestone. Its altitude requirements are thus similar to those of the *Juniperus* forest and, on the Libah Heleh, succession from it to the forest may sometimes be seen; it shares several species with the *Juniperus* forest and it is *a priori* to be expected that fire and heavy grazing should reduce parts of the *Juniperus* forest to an open woodland.

For these reasons it is here considered as a fire-grazing sub-climax to the Juniper forest. On the other hand there is a close parallel between the relations of this community with the *Juniperus* forest and those of the *Acacia etbaica*\* association with the evergreen scrub, and it is quite possible that this community should be treated either as an association in the open woodland formation or as a separate "broad-leaved tree open woodland" formation.



The five chief trees are *Olea somalensis*\*, *Acokanthera Schimperi*\*, *Combretum ferrugineum* A. Rich., *Sideroxylon Gillettii*\*, and *Acacia etbaica*\*; other trees are *Ficus ingens* Miq. and *F. glumosa*, *Pistacia falcata*\*, and *Pittosporum abyssinicum* Del. These are well spaced and between them are numerous bushes of *Dodonaea viscosa*\*, *Periploca ephedriiformis* on rocky places, *Dicoma somalensis* S. Moore, and *Cadia purpurea*\*.

The transition to *Juniperus* forest is as follows:—Shrubs of the species listed as fringing *Juniperus* forest appear in the shade of trees of the open woodland, forming clumps, Juniper appears in the clumps, the clumps grow larger, coalesce, the fringing shrubs disappear and the process is complete.

(5) *Evergreen scrub* around Harar.—Local dominants are *Acokanthera Schimperi*\*, *Cadia purpurea*\* where *Acokanthera* has been destroyed by fire, *Euphorbia* sp., *Dracaena*, at low altitudes on limestone. Among the larger trees which occur scattered through the scrub are *Ficus* spp., including *F. Thonningii* Blume, *Pappaea Radlkoferi*\*, *Croton macrostachys* Hochst., *Erythrina* sp., *Terminalia Brownei*\*. Other bushes and small trees are *Carissa edulis*, *Calpurnia subdecandra* (L'Herit.) Schweickerdt, *Premna viburnoides* A. Rich., *Osyris abyssinica*, *Rumex nervosus* Vahl, *Rosa abyssinica* R. Br., *Vangueria apiculata* K. Schum., *Euclea Kellau*, *Rhus glutinosa* Hochst. ex A. Rich., *Brucea antidysenterica* Lam., *Cassia mimosoides* S. Moore, *Doryalis abyssinica* Warb., *Tephrosia barbiger* Welw., *Rhus retinorrhoea*, *Acacia seyal*, *Grewia ferruginea* Hochst., *G. canescens*, *Heeria insignis*, *Grewia tembensis*, *Lannea Schimperi* (Hochst.) Engl., *Ochna inermis* Schweinf., *Sageretia spiciflora*, *Secamone punctulata* Decne., *Cussonia Holstii*, *Acacia etbaica*\*, *Fagara usambarensis* Engl., *Periploca ephedriiformis*, *Dodonaea viscosa*\*.

Some of the chief climbers are *Rubia discolor* Turcz., *Commicarpus plumbagineus*, *Cissus adenocaulis* Steud. and *C. Schimperi* Hochst., *Jasminum floribundum* R. Br., *Pterolobium exosum* (Gmel.) Bak. f., *Osyridicarpus Schimperianus* A. DC., *Adhatoda Schimperiana* Nees, *Helinus mystacinus* E. Mey., *Rhoicissus erythrodes* Planch., *Stephania abyssinica* var. *tomentella* Oliv.

Parasites:—*Loranthus Schimperi* var. *parviflorus* Hutch. & E. A. Bruce, *L. ugogensis* Engl., *Viscum nervosum* Hochst.; Herbs, *Sida Schimperiana* Hochst., *Rumex nervosus*, *Eulophia Rueppelii* (Rchb. f.) Summerhayes, *Dyschoriste radicans* Nees, *Plumbago zeylanica* L., *Rhynchelytrum repens* (Schum.) C. E. Hubbard, *Arthropteris orientalis* (Gmel.) O. Posth., *Aloe Steudneri* Schweinf., *Hibiscus crassinervius* Hochst., *Indigofera brevicalyx* Bak. f., *Polygala Quartiniana* A. Rich., *Orthosiphon somalensis* Vatke, *Lantana salvifolia* Jacq., *Abutilon angulatum* Mast.

*Economics*.—Cultivation in this zone is comparatively intensive. Sorghum and Maize are the chief cereals and near Harar wherever

a little water is available for partial irrigation the hill sides are terraced for the cultivation of coffee, *Catha edulis*, banana, sweet potato and other crops. Cattle are kept and mules and donkeys for transport. The population is fairly dense, and has caused much destruction of trees and bushes for firewood.

*The transition from Evergreen scrub to tree Acacia open woodland.*—Evergreen scrub borders on each of the three associations of the tree *Acacia* open woodland. Where the transition is to *Acacia Bussei*\* open woodland, the chief evergreen shrub is *Buxus Hildebrandtii*; where the transition is to *Acacia etbaica*\* open woodland, *Acokanthera Schimperi*\* predominates. Patches of evergreen scrub occur as post climaxes in such places as the banks of stream beds, shady ravines and steep north-facing slopes. An interesting example of the dependence of the evergreen scrub on a higher water supply than that necessary for the *Acacia* open woodland was seen on a Jurassic limestone hill approximately 10° 7' N. by 43° 16' E. Here, on a north-facing slope was an outcrop of a brown limestone fairly rich in clay in the middle of the usual pale limestone poor in clay. On the brown rock, and strictly confined to it were abundant bushes of *Buxus Hildebrandtii*\*, *Ficus salicifolia* and *Lannea malifolia*, while on the surrounding white rocks was *Acacia Bussei*\* open woodland, with *Croton Cliffordii*\*, *Aloe abyssinica*\* and *A. Rivae*.\*

Thus here at the transition zone the greater water retaining capacity of the more clayey soil decided whether evergreen scrub or open woodland should prevail. Elsewhere where the rainfall is higher, evergreen scrub is found on all types of rock.

There is evidence that parts of the open woodland bordering upon the evergreen scrub are in reality a sub-climax which would develop into evergreen scrub if the grazing were less intense. Thus, on the Libah Heleh mountains old *Acacia etbaica*\* trees are found with young evergreen shrubs springing up all round them and at Buramo evergreen shrubs (*Acokanthera*) appear in an alluvial area which has been protected as a government grazing reserve.

## 6. THE EVERGREEN FOREST FORMATION.

The climax community is a forest of evergreen trees with well-marked layers of shrubs and herbs beneath them. Owing to fires and cultivation the climax forest is mostly replaced by various successional communities.

This formation is the same as the sub-tropical evergreen forests of Abyssinia, East Africa and South Africa (Phillips 29).

The area occupied includes the upper parts of the Harar massif from about 6,500 ft. to 9,500 ft. and a small area on the Libah Heleh mountains in western Somaliland. In central and eastern Somaliland it occurs on the summit of the Golis range and on the Surud mountains (Collenette 31).

*Environment.*—No weather records are available. The rainfall however is probably greater than that of Harar, 33 in. per annum. In Somaliland clouds are frequent. The more mature soils are dark brown, dark grey or black. Organic carbon contents of 1.72 per cent., 2.78 per cent. and 4.82 per cent. were found in forest soils and 6.31 per cent. in a moist peaty soil in a marsh. This last soil had a  $P_H$  of 5.4. Eight other soils from various types of community in the moister *Podocarpus* section of the formation had  $P_H$  values ranging from 6.0 to 7.1. Some of these soils were overlying limestone, although none held more than a trace of lime and thus it is clear that here leaching is sufficient for slightly acid soils to be developed even from calcareous rocks. In the drier *Juniperus procera*\* association two soils had  $P_H$  values of 7.2 and 7.4. In this formation a more or less deep layer of soil is produced everywhere except on vertical cliffs.

*Communities within the evergreen forest formation.*—Two well-marked associations occur, a *Juniperus procera*\* association in the drier parts of the formation and a *Juniperus-Podocarpus* association in the moister parts. Only the former is represented in Somaliland.

*The Juniperus procera association.*—The forest is comparatively open and dry, the *Juniperus* not casting a very heavy shade. Generally it grows sufficiently openly to retain its branches down to near ground level and thus differs in appearance from individuals of the same species in the *Juniperus-Podocarpus* association, which grow closer together and develop tall clear boles. In this association *Juniperus* cannot become established in the open but only in the shelter of bushes. This again is in contrast with the other association where *Juniperus* develops out of open grassland. The shrubs of the succession towards *Juniperus* forest are usually also found in the evergreen scrub. Examples are, in the Harar district, *Carissa edulis*, *Calpurnia subdecandra*, *Osyris abyssinica*, *Rosa abyssinica*, *Dovyalis abyssinica*, *Celtis Kraussiana* Bernh., *Juniperus procera*\*, *Clerodendrum myricoides*, *Podocarpus gracilior* Pilger, *Sideroxylon oxyacantha* Baill., *Myrsine africana* L., *Euphorbia polyacantha* Boiss., *Dovyalis verrucosa* Warb. In the Libah Heleh are *Rhus natalensis*, *Pittosporum abyssinicum*, *Teclea nobilis*, *Gymnosporia luteola*, *Adhatoda Schimperiana*, *Carissa edulis* var. *tomentosa*, *Euclea Kellau*, *Sageretia spiciflora*, *Cadia purpurea*.

In the Libah Heleh about 70 per cent. of the trees were *Juniperus procera*\*, 20 per cent. *Sideroxylon Gillettii*\*, and 10 per cent. *Olea somalensis*\*. Among the undershrubs and tall herbs *Ephedra Alte*, *Gymnosporia luteola*, *Psiadia arabica* Jaub. & Spach, *Stachys Hildebrandtii* Vatke, *Coleus albidus* Vatke, *Pollichia campestris* Ait., *Galium Aparine* L., *Umbilicus botryoides* Hochst. occurred. The lesser herbs include *Pleurochaete Beccarii* Vent., *Tortulea atrovirens* (Sm.) Lindl., *Actinopteris australis*, *Cheilanthes coriacea*, *Asplenium aethiopicum* (Burm.) Becherer, *Eragrostis* sp. The climber *Secamone*

PLATE III.



*Evergreen Forest Formation, Podocarpus, etc., Association near Kolubi,  
6° 25' N., 41° 40' E., c. 7,500 ft.*

*Podocarpus* forest being cleared. The trees are *Podocarpus gracilior* and  
*Olea Hochstetteri*.

[To face page 66.]



*punctulata* is sometimes abundant. No angiospermous epiphytes occur in this forest, but lichens, including *Usnea articulata* Hoffm., are frequent. This absence of angiospermous epiphytes is another contrast with the *Juniperus-Podocarpus* association.

In very many respects this association represents a transition from the evergreen scrub to the evergreen forest formation. The coffee and *Catha edulis* cultivation, typical of the evergreen scrub, with their characteristic hedges largely composed of tree *Euphorbiae*, disappear in this association, while the cultivation of wheat and barley, typical of the forest formation, begins.

*Juniperus-Podocarpus* forest.—The communities within this formation are numerous and the relations between them obscure. Of the forest itself there are several types containing different proportions of *Juniperus*, *Podocarpus* and other trees, sometimes with neither *Juniperus* nor *Podocarpus* present at all. No attempt can be made to describe these types in any detail but it seems clear that the type with *Juniperus* as dominant is a xeroseral community generally occurring on steeper slopes with shallow soil. The *Podocarpus* only becomes important on deeper soils. On very steep and rocky places a xeroseral evergreen scrub or bush occurs which contains at lower altitudes many species of the evergreen scrub formation and at higher altitudes species typical of the *Erica* thicket formation, including *Erica arborea* Linn. itself.

A very important and extensive subclimax community is open grassland which is produced by the clearing of the forest for grazing and cultivation and is prevented from reverting to forest by fires, grazing and the search for firewood. A stage in the secondary succession from this grassland to forest is represented by a tangled mass of tall rank herbs, climbers and shrubs.

The climax forest consists of (a) large trees up to about 30 m. tall forming either an open or a closed canopy; (b) a layer of shrubs and small trees, interrupted where the big trees form a closed canopy, and continuous where they are open; (c) climbers; (d) herbs; (e) epiphytes.

Among big trees are *Podocarpus gracilior*, *Juniperus procera*\*, *Olea Hochstetteri* Bak., *Pygeum africanum* Hk. f., *Schefflera abyssinica* (Hochst.) Harvey (usually on steep slopes), *Lachnophyllis congesta* (R. Br.) C. A. Sm., *Dombeya Bruceana* A. Rich., *Myrica salicifolia* Hochst. ex A. Rich. (in marshy places), *Erythrina Brucei* Schweinf. Some of the chief small trees and shrubs are *Discopodium penninervium* Hochst., *Trichilia Volkensii* Gürke, *Maesa lanceolata* Forssk., *Gymnosporia* sp. (5131), *Teclea nobilis*, *Dracaena afromontana* Mildbr., *Pavetta abyssinica* Fresen., *Cassipourea abyssinica* Alston, *Lasiosiphon glaucus* Fres., *Ekebergia Ruppeliana* A. Rich., *Olea chrysophylla*\*, *Rhamnus Staddo* A. Rich., *Acacia abyssinica*\*

*Galiniera coffeoides* Del., *Loranthus sarertaensis* Hutch. & E. A. Bruce, *Rhus abyssinica* Hochst., *Buddleja polystachya* Fresen., *Rubus Volkensii* Engl., *Jasminum abyssinicum* R. Br., *Gymnosporia luteola*, *Halleria lucida* L., *Vernonia amygdalina* DC., *Allophylus abyssinicus* (Hochst.) Radlk., *Debregeasia salicifolia* Reindle, *Trichocladus malosanus* Baker, *Bersama abyssinica* Fresen., *Gymnosporia arbutifolia* (Hochst.) Loes.

Some of the climbers and lianes are *Rosa abyssinica*, *Urera hypselodendron* Wedd., *Jasminum abyssinicum*, *Cissus cyphopetala* Fresen., *Toddalia asiatica* Lam., *Asparagus asiaticus* Linn., *Rubus apetalus* Poir., *Periploca linearifolia* Dill. & Rich., *Clematis* sp.

Among the herbs, *Hypoestes triflora* (Forssk.) Roem. & Schultes, *Sida triloba* Cav., *Asplenium monanthus* L., *Acanthus eminens* C.B. Cl., *Ceratostigma abyssinicum* Aschers., *Crassula alsinoides* (Hk. f.) Engl., *Poa leptoclada* Hochst. ex A. Rich., *Veronica abyssinica* Fres., *Digitaria abyssinica* Stapf, *Cardamine africana* L., *Arisaema Schimperianum* Schott, *Pteris dentata* Forssk., *Caucalis incognita* Norman, *Sanicula europaea* Linn., *Euphorbia longecornuta* Pax, *Pimpinella simensis* Bth. & Hk. f., *Phyllanthus meruensis* Pax, *Coleus lanuginosus* Hochst., *Pimpinella Neumannii* Engl., *Viola abyssinica* Steud., *Primula verticillata* Forssk. var. *simensis* Hk. f. (damp rocks), *Hibiscus Ludwigii* E. & Z., *Otostegia repanda* Benth., *Eragrostis Schweinfurthii* Chiov., *Crassula abyssinica* A. Rich., *Vernonia Leopoldii* Vatke, *Athrixia rosmarinifolia* O. & H., *Pteris cretica* Linn., *Stachys aculeolata* Hk. f., *Ranunculus pubescens* Thunb., *Phalaris arundinacea* Linn., *Calamintha simensis* Benth., *Orizopsis* sp., *Sempervivum leucoblepharum* (Webb) Hutch. & E. A. Bruce (cliffs), *Argyrolobium ramosissimum* Bak., *Epilobium fissipetalum* Steud., *Asplenium abyssinicum* Fée, *Apium nodiflorum* Linn., *Adiantum Capillis-Veneris* Linn., *Funaria hygrometrica* Hedw., *Anthroceros* sp.

Among the epiphytes *Usnea longissima* Ach., *Lindbergia abbreviata* (Schimp.) Broth., *Leucodon dracaenae* Vent., *Anaptychia leucomela* Ach., *Peperomia abyssinica* Miq., *Neckera remota* Bry., *Tortula erubescens* (C.M.) Broth., *Xanthoria parietina* Th. Fr., a Lichen (indet.), *Polypodium lanceolatum* Linn., *Peperomia reflexa* A. Dietr., *Orchidaceae* spp. and *Polystachya Rivae* Schweinf., *Leptogium cyanescens* Kbr., *Physcia stellaris* Fr., *Parmelia* sp. (5432), *Ramalina yemensis* Lyl., *Loxogramma lanceolata* (Sw.) Pr.

*Sublimax communities*.—Open grassland. This consists of a close growth of tufted grasses which do not however form a turf such as could be lifted except in places which are unusually damp and well grazed. The area was visited at the end of the dry season, very few of the plants of this community were in flower and it was impossible to determine the dominant grasses. Some members of the community were *Pennisetum clandestinum* Hochst., *Aristida*

*adoensis* Hochst., *Hyparrhenia hirta*, *Silene chirensis* A. Rich., *Cynodon Dactylon*, *Microchloa abyssinica* Hochst. This almost complete cessation of flowering in the dry season is in marked contrast with the state of affairs in the evergreen forest itself where almost all the trees and shrubs were more or less in flower.

In moist places, around springs, etc., there occurred *Lythrum rotundifolium* Hochst. ex A. Rich., *Epilobium hirsutum* L., *Potentilla reptans* Linn., *Nasturtium officinale*, *Alchemilla cryptantha* Steud., *Anagallis serpens* Hochst., *Carex acutiformis* Ehrh., *Siegesbeckia abyssinica* O. & H., *Hydrocotyle monticola* Hk. f., *Scirpus costatus* Boeck., *Pycnus aethiops* C.B. Cl., *Juncus Bachiti* Hochst., *Alchemilla pedata* Hochst., *Fuirena pubescens* (Lam.) Kunth, *Cotula abyssinica* Sch. Bip., *Lobelia stellaroides* Bth. & Hk. f., *Scirpus setaceus* Linn., *Hydrocotyle asiatica* Linn., *H. natans* Cyr.

*Tangle in the secondary succession to forest.*—This community contains a great variety of tall herbs and in addition many of the shrubs listed as members of the forest appear in it. There is usually no single dominant but locally *Echinops Ellenbeckii* O. Hoffm., with its large globular heads of crimson flowers, may be very conspicuous. Other important plants are *Tephrosia atrovioacea* Bak. f. ex De Willd., *Hypericum Quartinianum* A. Rich., *Momordia Schimperiana* Naud., *Barleria* sp., *Hypoestes antennifera* S. Moore, *Lactuca capensis* Thunb., *Kalanchoe Quartiniana* A. Rich., *Cluytia abyssinica* Jaub. & Spach., *Echinops macrochaetus* Fres., *Hypericum lanceolatum* Lam., *Myrsine africana*, *Senecio myrioccephalus* Sch. Bip., *Phagnalon hypoleucum* Sch. Bip., *Inula confertiflora* A. Rich., *Leonotis velutina* var. *rugosa* Bak., *Lavatera abyssinica* Hutch. & Bruce, *Stephania abyssinica* Walp., *Microglossa Elliotii* S. Moore, *Coreopsis macrantha* Sch. Bip., *Brachypodium flexum* Nees var., *Lithospermum officinale* L., *Pentas Schimperiana* Vatke, *Nepeta Petitiana* Baker, *Helichrysum globosum* Sch. Bip., *H. Hochstetteri* Hk. f., *H. Schimper* Sch. Bip., *Pittosporum abyssinicum* Del.

*Economics.*—The forest produces timber of *Podocarpus* and *Juniperus* which might be valuable (that of the *Juniperus* is resistant to insect attacks) but is at present largely wasted, being burnt down to clear the ground for temporary cultivation. Large areas now covered by valueless tangle and scrub or almost valueless grassland could grow *Juniperus* in fairly large quantities. Cattle are kept and the chief crops are wheat (*Triticum durum* and *dicoccum*), barley, various pulses and maize. Coffee and *Catha* are not grown and irrigation is not practised in this community.

*Transition from evergreen forest to evergreen scrub.*—The forest becomes more and more restricted to alluvial areas. Elsewhere *Juniperus* occurs simply as scattered bushes among the other members of the scrub. In the Libah Heleh interesting areas occur in which the *Juniperus* trees have been killed by drought, their



dead stems standing above the *Buxus* bushes which are left in sole possession. Everywhere the transition between the evergreen scrub which is the climax in its own formation and that which is a stage in the xerosere of the *Juniperus* forest is very gradual and it is often impossible to say which community one is in.

(7) *Erica thickets formation*.—The climax community is an evergreen thicket casting a rather light shade of small trees about 4 m. high with *Erica arborea* Linn. as dominant, beneath this is a rich herbaceous vegetation. As a fire-grazing subclimax a grassland is found in which the herbaceous plants form a turf that might be lifted in a sheet. The area occupied is very small, being restricted to a small patch on the summit of Mt. Kondudo above 9,300 ft. (where only the grassland subclimax is represented) and a somewhat larger patch on the summit of Gara mulata above 9,500 ft.

For the climate no data are available. It seems probable, however, that the main difference between the climate of this formation and that of the evergreen forest is one of temperature and not of rainfall. The soils are dark brown or black, leached almost free of lime, organic carbon percentages of 6.29 and 4.55 were found and  $P_H$  of 5.63, 6.63, 6.9 and 7.25.

The climax community occurs chiefly on the more shaded northern slopes of the mountains as here it does not dry out so completely in the dry season and hence is less liable to destruction by fire. The small trees and shrubs are *Erica arborea* dominant, frequent *Hypericum lanceolatum*, *Hagenia abyssinica* Willd., occasional *Pitiosporum lanatum* Hutch. & E. A. Bruce, and *Crotalaria Erlangeri* Harms, *Myrsine africana*, an abundant undershrub, *Lobelia Rhyncoptalum* Hemsl., *Rubus Volkensii*, and among the herbs *Leonotis velutina* var. *rugosa*, *Dryopteris Schimperiana* (Hochst.) C. Chr., and other ferns, *Thalictrum minus* L., *Arabis albida* Stev., *Scabiosa Columbaria* L., *Helichrysum Traversii* Chiov. (No. 5321), *Ranunculus oreophytus* Del., *Alchemilla kivuensis* Engl., *Conium maculatum* Linn., *Malabaila abyssinica* Boiss., *Cynoglossum coeruleum* Hochst., *Geranium simense* Hochst. ex A. Rich., *Cerastium caespitosum* Gilib., *Bartsia longiflora* Hochst., *Veronica abyssinica* Fres., *Swertia Schimperii* Griseb. and *S. Quartliniana* A. Rich., *Pellaea quadri-pinnata* (Forssk.) Prantl, *Anthemis abyssinica* J. Gay, *Vicia sativa* var. *angustifolia* Ser., *Lysimachia africana* Engl., *Calamintha simensis* Benth., *Bromus adoensis* Hochst., *Cystopteris fragilis* (L.) Bernh., *Oxyrrhynchium kenyae* Dix. ined., *Mnium rostratum* Schrad., *Funaria hygrometrica*.

On Gara mulata mountain several areas where this *Erica* thicket had recently been burnt down were noticed. The *Erica* was regenerating from its roots but it is clear that too frequent burning would destroy it. Thus is created the open grass fire subclimax which is more extensive than the *Erica* thickets. The

chief grasses were not seen in flower. A marked feature is the abundance of *Helichrysum abyssinicum* Sch. Bip., *Landtia Rüppellii* Benth. & Hk. f., *Hypoxis* sp. (5221), *Thymus serpyllum* Linn., and *Micromeria biflora* Benth. *Albucca abyssinica* Jacq., *Gerbera piloselloides* Cass., *Alchemilla kiwuiensis*, *Merendera abyssinica* A. Rich., *Bartsia Petitiiana* Hemsl., *Caucalis melanantha* Steud., *Salvia nudicaulis* Vahl var. *nubica* Bak., *Moraea diversifolia* Baker, and *Argyrolobium virgatum* Baker also occur.

The grassland provides grazing for cattle and on Gara mulata one Galla village is found in this formation.

*Evidence, chiefly Botanical, for a Pluvial Period in Western British Somaliland and Adjacent Regions.*

1. The western subdesert is very poor in plants not found in other formations and the North-Western *Commiphora*-bush *Acacia* open scrub formation is poor in species if compared with the same formation in the eastern coastal districts, and in the eastern Haud. For instance at one spot in the Haud, on a uniform level plain, twelve species of *Commiphora* were collected in three days, while this number of species was not found in as many weeks in this formation in the northern coastal districts, on several types of soil and at different altitudes. Many species of plants do not occur much west of Berbera in spite of apparently favourable conditions being found. Examples are *Conocarpus lancifolius* Engl., *Kelleronia splendens* Schinz and *K. Gillettii* Bak. f., *Acacia misera*\*, *Zygo-phyllum Hildebrandtii*. These facts can be accounted for on the hypothesis that a pluvial period has occurred in geologically recent times in Western British Somaliland during which the subdesert and *Commiphora*-bush *Acacia* open scrub were replaced by more mesophytic formations. When arid conditions prevailed after the pluvial period these formations were formed through migration from the east and south-east and therefore have naturally only a certain number of the species of the latter regions, and a few endemic species of their own. Such a hypothesis will also account for the wide distribution of species belonging to the evergreen scrub formation which are now restricted to small isolated patches. In the pluvial period the evergreen scrub must have occupied a much larger area and the migration of its species was relatively easy. Without some such hypothesis it is very difficult to account, for instance, for the occurrence of *Erica arborea*, a plant with no special means of dispersal, on the Golis range separated by 150 miles of country too dry for it from its nearest station in the Harar district.

Evidence bearing on this question is also available from the *Erica* thicket formation of the mountains near Harar, since here there occur a number of plants such as *Thalictrum minus*, *Ranunculus oreophytus* and *Lobelia Rhyncho-petalum*, which do not occur

t. and are separated by many miles of lower nearest station in the main highlands of

distribution of these plants it is necessary to that the pluvial period was also one of rather lower temperature. It may be, in their case, temperature rather than altitude restricts them to above a certain altitude.

Evidence for a pluvial period, according to Mr. C. D. Government geologist, is not wanting in Western Africa. In the form of alluvial gravels more extensive than now, sand could deposit and erosion of eocene deposits could be accomplished with the present climate.

The occurrence of a recent pluvial period is in harmony with the evidence of archaeologists and geologists working in Egypt, etc. See particularly G. Caton Thompson and his hypothesis has certain economic implications. Fruitful trees such as *Cordeauxia edulis* Hemsl.\*, *Acacia*, and *Conocarpus lancifolius*, valuable for its fruit, may be successfully introduced into the northern *Acacia* formation from the eastern and south-western regions. The reason for their absence in the north-west may be due to their inability to migrate there.

#### *Amplification of Collenette's Paper.*

Notes.—Mr. Collenette remarks that Somali plant names, those of Ishaak tribes and those of the Darod. It should be added that among the Darod there is a division between the Harti group, the main, Warsangeli and Dolbahanta, and the group including the Ogaden, Abasgul, Ali Gheri, North and South-West. Mr. Collenette's Darod names are of the Harti group. In the west the Esa have names for plants, which is used in part by the Ishaak, also use some of the Ishaak names. They use those used among the Ishaak.

Species.—The two species of *Dorstenia* collected, *D. cuneata*, were not confined to the southern sides. Collenette reports for *D. crispa* in the Al Hills.

*Stemmatoides* K. Sch., *Caralluma Dicapuae*, E. Br., and *Sarcostemma viminalis* are among the most important plants chewed by the Somalis to allay a bitter taste and it is said that they are always chewed in the morning than in the afternoon. This may suggest that they possess that type of organic acids are produced as a product of photosynthesis consumed in photosynthesis.

*Disinfectant*.—When their wicker and gum milk have become foul the Somalis cleanse them in

an interesting way. They make in the ground a small pit, having a narrow opening. In the pit, which is a foot or two deep, they make a fire of the wood of certain species of tree, principally *Balanites aegyptiaca*\*, *B. orbicularis*\*, *Acacia spirocarpa*\*, *Commiphora tubuk*, and *Boscia minimifolia*\*. The Han is then inverted over the mouth of the pit and is said to be cleansed by the smoke so that it no longer sours the milk put into it.

*Notes on ornithophily in Somaliland and the Harar district of Abyssinia.*

In Somaliland, according to the Somalis, several kinds of birds visit a large number of different kinds of flowers in order to obtain the honey. The following observations were made on this habit. The red or orange flowered *Aloe abyssinica*\*, which grows in sheets in parts of the tree *Acacia* open woodland, was seen to be visited by the Somali Mariqua Sunbird, *Cinnyris mariquensis hawkeri*, by the Superb Starling, *Spreo superbus*, and also by another species of Glossy Starling. The starlings, although assiduous in visiting this species of *Aloe* when it was in bloom, were not seen visiting any other flowers. They are common in Somaliland in the tree *Acacia* open woodland and may at any time be seen feeding on the ground, on insects. The sunbird on the other hand, which though very generally present is by no means so abundant as the starling, was several times seen visiting a number of other flowers. For instance *Aloe somaliensis*\* and *A. Rivae*\*, *Blepharis fruticulosa*, a white flowered Labiate, *Loranthus curviflorus* Benth., *Justicia* sp. (4881) and *Coleus cicatricosus* Hutch. & E. A. Bruce. These plants have yellow, white, blue or crimson flowers, and thus the sunbird is in no way limited in its choice of colours. In the dry season the sunbirds are very much restricted to the *Loranthus* which is one of the few common plants in flower at that time. It seems also that its flowers are not visited by insects, at any rate no insect visitors were seen. In the case of the Aloes, on the other hand, both bees and butterflies were seen visiting the flowers. The sunbird is far more suited to visiting flowers than the glossy starlings on account of its lesser weight, its longer, slenderer beak, and the fact that unlike the starling it can cling upside down in order to get at the flowers.

In Abyssinia several unidentified species of sunbird were seen visiting a number of plants, and sunbirds were seen in greater numbers than in Somaliland. The plants visited were *Carissa edulis*, *Vangueria apiculata*, which was seen visited on more than one occasion by several species of sunbird, *Adhatoda Schimperiana*, *Erythrina* sp. (5094) very much visited, *Echinops Ellenbeckii*, *Leonotis velutina* var. *rugosa*, *Woodfordia uniflora* (A. Rich.) Koehne, *Crotalaria Erlangeri*, and *Erythrina Brucei*. Several of these plants have red flowers (in *Echinops* this is an unusual colour), red being generally considered very common among ornithophilous flowers. *Vangueria apiculata*, however, which is very assiduously

visited, has green flowers. These plants occur in the evergreen scrub, the evergreen forest and also the *Erica* thicket formations, and it seems very probable that in the last named the Tree *Lobelia*, *L. Rhyngopetalum*, is also visited by sunbirds.

It is thus clear that ornithophily is a common occurrence in this part of Africa, except in the more arid zone, where it was not observed. Most of the observations made here can be paralleled from Southern Tropical Africa where *Aloes* and *Erythrina* and *Leonotis leonurus* are visited by sunbirds. M. S. Evans in a paper on "The fertilisation of flowers, with some illustrations from the Natal flora" remarks that *Loranthus Kraussianus* Meisn. is pollinated only by sunbirds and that if these are kept from it no seed is set. He also remarks that other species of birds besides sunbirds may sometimes visit flowers. It has long been known that ornithophily is very prevalent in the South-Western Cape, but it has wrongly been considered that this was somewhat of a special feature of this region separating it from the rest of Africa.

That sunbirds are ready to visit flowers unfamiliar to them is proved by an instance when I saw one visiting a species of *Opuntia* near Harar.

*List of Scientific Names of the more important plants in the foregoing pages with their equivalent vernacular names.*

**Acacia** Asak Willd.—Adad medu. A. Bussei Harms.—Galol. A. etbaica Schweinf.—Sugsug, Khansa, Yube. A. glaucophylla Steud.—Rede. A. mellifera Benth.—Bilel. A. misera Vatke—Khansa, Sarman. A. nilotica Del.—Marah. A. Senegal Willd.—Jalefon, Adad. A. Sieberiana DC.—Jerin. A. somalensis Vatke—Hini. A. sp. nr. Bussei Harms—Sarman. A. spirocarpa Hochst.—Gurha. A. sp. nr. subalata Vatke—Marah. **Acokanthera** Schimperii Schweinf.—Waba. **Adenia** venenata Forssk.—Adahi medu. **Aerva** tomentosa Forssk.—Sorna. **Albizzia** sp.—Rhedib. **Aloe** abyssinica Lam.—Daar Gabar. A. Rivaie Baker—Daar Burug. A. somaliensis C. H. Wright—Daar biyu. A. trichosantha Berger—Daar merodi. **Andropogon** cyrtocladus Stapf—Dur. **Balanites** aegyptiaca Del.—Ghot. B. glabra Mildbr. & Schlecht.—Kidi. B. orbicularis Sprague—Kulan. **Berchemia** discolor Hemsl.—Den. **Boscia** minimifolia Chiov.—Megag. **Buxus** Hildebrandtii Baill.—Dusogh. **Cadaba** farinosa Forssk.—Ditab. C. glandulosa Forssk.—Dukhul. C. heterotricha Stocks—Highi. **Cadia** purpurea Ait.—Salabma. **Caesalpinia** sp.—Jirma. **Calotropis** procera Ait.—Bon ad. **Canthium** bogosensis Hutch. & E. A. Bruce—Gorurgi. **Caralluma** speciosa N.E. Br.—Udab tis. **Chrysopogon** Aucheri Stapf var. quinquiplumis Stapf—Daremo. **Cissus** quadrangularis (L.) Planch.—Gaad. C. rotundifolia Vahl—Armo. **Combretum** tricanthum Fres.—Obol. **Commiphora** cuspidata Chiov.—Didin, Myrrh. C. erythraea Engl.—Hagar. C. lughensis Chiov.—Hagar ad. C. ogadensis Chiov.—Hagar medu. **Cordeauxia** edulis Hemsl.—Yeeb. **Cordia** Gharaf Ehrenb.—Mared. C. ovalis R. Br.—Mared.

**Croton** *Cliffordii* Hutch. & E. A. Bruce—Bahie. **Cymbopogon** *Schoenanthus Spreng.*—Aus Damer. **Delonix** *elata* (L.) Gamble—Lebi. **Dobera** *glabra* Juss.—Garas. **Dodonaea** *viscosa* L.—Hairimat. **Dracaena** *schizantha* Bak.—Morli. **Eragrostis** *hararensis* Chiov.—Gubungub. **Euphorbia** *abyssinica* Lem.—Hasadin. *E. grandis* Lem.—Hasadin. *E. infausta* N.E. Br.—Dibu. *E. nubica* N.E. Br.—Ergin. *E. scoparia* N.E. Br.—Mirhig. *E. somalensis* Pax—Fala fala. **Ficus** *populifolia* Vahl—Nidir. *F. Sycomorus* L.—Dare. *F. vasta* Forssk.—Berde. **Grewia** *mollis* Juss.—Debi ad. *G. Schweinfurthii* Burret.—Debi medu. *G. tenax* (Forssk.) Fiori—Duferu. **Hypoestes** *Hildebrandtii* Lindau—Ged waraba. **Indigofera** *Ruspoli* Bak. f.—Jelub. **Iphiona** *rotundifolia* O. & H.—Gegabot. **Juniperus** *procera* Hochst.—Deyib. **Lannea** *malifolia* Hutch. & E. A. Bruce—Bero. **Lawsonia** *inermis* L.—Elan. **Leptadenia** *Spartum* Wight—Morogh. **Maerua** *sessiliflora* Gilg—Ji-eh. *M. somalensis* Pax—Kalan. **Mimops** *Kummel* Hochst.—Anjel. **Olea** *chrysophylla* Lamk.—Wigir. *O. somalensis* Bak.—Wigir. **Panicum** *turgidum* Forssk.—Dungara. **Pappea** *Radlkoferi* Schweinf.—Adadak. **Peucedanum** *fraxinifolium* Hiern—Ged bidawi. **Pistacia** *falcata* Becc.—Hraa mali. **Rhigozum** *somalense* Hall. f.—Binin. **Salsola** *foetida* Del.—Gulan. **Salvadora** *persica* L.—Adi. **Sansevieria** *Ehrenbergii* Schweinf. ex Bak.—Hig. **Sarcostemma** *viminale* R. Br.—Hangeyu. **Senecio** *longiflorus* (DC.) O. & H.—Godor. **Sideroxylon** *Gilletii* Hutch. & E. A. Bruce.—She. **Sporobolus** *variegatus* Stapf—Dihe. **Sterculia** *Rivae* Chiov.—Garaho. **Suaeda** *fruticosa* Forssk.—Horun. **Tamarindus** *indica* L.—Hamar. **Tamarix** *nilotica* Ehrenb.—Dot. **Terminalia** *Brownei* Fres.—Wob. **Turraea** *parvifolia* Desf.—Dornai. **Ziziphus** *Hamur* Engl.—Hamud. *Z. mauritiana* Lam.—Gob. *Z. mucronata* Willd.—Gob yer. **Zygophyllum** *Hildebrandtii* Engl.—Bal ad.

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# Enumeration of the plants collected by Mr. J. B. Gillett in Somaliland and Eastern Abyssinia

J. HUTCHINSON and EILEEN A. BRUCE

Up to the present specimens from Somaliland have usually been rather meagre and have been collected by travellers without much botanical training and lacking in proper equipment. This is not the case with Mr. Gillett's collection, however. He was able to acquire abundant material of nearly every species he met with in flower or fruit, and it has been possible to distribute sets of duplicates to various herbaria on the continent of Europe\*, and in addition one each to the Agricultural Department at Berbera, and the Forestry Department in Kenya.

This adds greatly to the value of the collection, and should at least assist in preventing the indiscriminate publication of superfluous names owing to lack of material. Great care has been taken to ascertain whether the species which were not determinable at Kew had been described in other herbaria, and we are particularly indebted to Professor Dr. Chiovenda, at Bologna, for much assistance and for describing several new species, and to botanists at other institutions. Our thanks are also due to our colleagues, Mr. C. E. Hubbard and Mr. E. Milne-Redhead, who have worked out the *Gramineae* and *Acanthaceae* respectively, to Mr. V. S. Summerhayes for the Orchids, to Miss C. I. Dickinson, who has identified the Lichens, Mr. H. N. Dixon the Mosses, and Mr. F. Ballard the Ferns.

The working up of this collection has demonstrated especially the close affinity of the Somali flora with that of Arabia, and in consequence many of Forsskal's names in his *Flora Arabica* have to take precedence over those used in the *Flora of Tropical Africa*. The species which are known only from Somaliland and Arabia are indicated in the enumeration. A large number of these North East Tropical plants seem to be distributed only as far south as Tanganyika Territory, in a few cases ranging eastwards through Arabia to India, especially to Scind.

The families and genera of flowering plants are arranged mainly after the sequence followed in Hutchinson and Dalziel's *Flora of West Tropical Africa*. The species are alphabetical, and scattered through the paper are descriptions of nearly fifty novelties.

*Abbreviations*, F.T.A.—*Flora of Tropical Africa*.

F.W.T.A.—*Flora of West Tropical Africa*.

*Vernacular names and place names*.—These are mainly written according to the Royal Geographical Society's system ii.

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\* Sets have been distributed to Bologna, Paris, Berlin and Upsala.

## MUSCI (by H. N. Dixon)

*Erpodium Hanningtonii* Mitt.

SOMALILAND: S. E. Auboba, long. 43° 4' E., lat. 9° 59' N., 1,620 m., Nov., No. 4605.

*Orthotrichum diaphanum* Schrad.

As above, No. 4605.

*Funaria hygrometrica* Hedw.

ABYSSINIA: Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,520 m., capsules red, Mar., No. 5286. 3,180 m., 5 Mar., No. 5369.

*Leucodon dracaenae* Vent.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,340 m., green, Feb., No. 5134.

*Lindbergia abbreviata* (Schimp.) Broth.

ABYSSINIA: As above, No. 5133.

*Mnium rostratum* Schrad.

ABYSSINIA: Gara mulata Mt., 3,060 m., Mar., No. 5365.

*Neckera remota* Bry. eur.

ABYSSINIA: Sarerta Mt., long. 42° 19' E., lat. 9° 30' N., 2,400 m., green, fructifications red, Feb., No. 5183.

*Oxyrrhynchium kenyae* Dix. ined.

ABYSSINIA: Gara mulata Mt., 3,060 m., capsules reddish, Mar., No. 5364.

*Pleurochaete Beccarii* Vent.

SOMALILAND: Libah Hele Mt., long. 43° E., lat. 10° 20' N., 1,770 m., forming cushions, Dec., No. 4709.

*Pleuropus sericeus* (Hornseh.) Broth.

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 25' N., 2,430 m., fructifications reddish, Mar., No. 5438.

*Tortula atrovirens* (Sm.) Lindb.

SOMALILAND: Sigib Mt., long. 43° 11' E., lat. 10° 19' N., 1,560 m., Feb., No. 4997.

*T. erubescens* (C.M.) Broth.

ABYSSINIA: Sarerta Mt., long. 42° 19' E., lat. 9° 30' N., 2,100—2,400 m., brown, Feb., No. 5189.

## LICHENES (by C. I. Dickinson)

*Anaptychia leucomela* Ach.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,400 m., grey, Feb., No. 5141.

*Leptogium cyanescens* Körb.

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 25' N., 2,250 m., thallus very dark green, fructifications dark brown, Mar., No. 5430.

*Parmelia caperata* Ach.

SOMALILAND: South East of Auboba, long. 43° 4' E., lat. 9° 59' N., 1,620 m., grey, Nov., No. 4607.

*P. perlata* Ach. var. *ciliata*.

SOMALILAND: Libah Hele Mt., long. 43° E., lat. 10° 20' N., 1,560 m., Dec., No. 4699.



*P. tiliacea* Ach.

As above, No. 4699.

*P. sp.*

ABYSSINIA : Yuka, long.  $41^{\circ} 40'$  E., lat.  $9^{\circ} 25'$  N., 2,250 m., thallus green, fructifications brown, Mar., No. 5432.

*Physcia stellaris* Fr.

SOMALILAND : South East of Auboba, 1,620 m., 20 Nov., No. 4608.

ABYSSINIA : Yuka, 2,250 m., thallus pale grey, Mar., No. 5431.

*Ramalina yemensis* Nyl.

ABYSSINIA : Yuka, 2,250 m., fronds green erect, Mar., No. 5433.

*Theloschistes chrysophthalmus* Beltr.

SOMALILAND : Libah Hele Range, long.  $43^{\circ}$  E., lat.  $10^{\circ} 20'$  N., 1,200 m., thallus grey, fructifications orange, Dec., No. 4686.

*Usnea articulata* Hoffm.

SOMALILAND : Libah Hele Mt., 1,770 m., yellowish grey, Dec., No. 4708. Vernac.—*Sarokh*.

*U. longissima* Ach.

ABYSSINIA : Galla Pass, long.  $42^{\circ} 19'$  E., lat.  $9^{\circ} 28'$  N., 2,340 m., Feb., No. 5130.

*Xanthoria parietina* Beltr.

SOMALILAND : S.E. Auboba, long.  $43^{\circ} 4'$  E., lat.  $9^{\circ} 59'$  N., 1,620 m., greenish yellow, Nov., No. 4606.

ABYSSINIA : Sarerta Mt., long.  $42^{\circ} 19'$  E., lat.  $9^{\circ} 30'$  N., 2,400 m., orange, Feb., No. 5190.

## PTERIDOPHYTA (by F. Ballard)

### POLYPODIACEAE.

*Cystopteris fragilis* (Linn.) Bernh. in Schrad. Neu. Journ. 1, 2 : 27 (1806).

ABYSSINIA : Gara Mulata Mt., long.  $41^{\circ} 45'$  E., lat.  $9^{\circ} 15'$  N., 3,000 m., lower *Erica* thicket with *Juniperus*, Mar., No. 5371.

*Dryopteris Schimperiana* (Hochst.) C. Chr. Ind. Fil. 291 (1905).

ABYSSINIA : Kondudo Mt., 2,640 m., rank herbage on limestone slopes, No. 5227.

*Arthropteris orientalis* (Gmel.) O. Posth. in Rec. Trav. Bot. Neerl. 21: 218 (1924) ; *Dryopteris orientalis* (Gmel.) C. Chr.

ABYSSINIA : Gobelli, long.  $41^{\circ} 59'$  E., lat.  $9^{\circ} 10'$  N., 1,680 m., in lower evergreen formation beneath granite boulders, Mar., No. 5256.

*Asplenium abyssinicum* Fée Gen. Fil. (5me Mém.) 199 (1850-52).

ABYSSINIA : Gara Mulata Mt., long.  $41^{\circ} 45'$  E., lat.  $9^{\circ} 15'$  N., 3,000 m., in evergreen forest, Mar., No. 5375.

*A. aethiopicum* (Burm.) Becherer in Candollea 6: 23 (1935) ; *A. praemorsum* Sw.

SOMALILAND : Buramo, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ}$  N., 1,740 m., on gneiss slopes, Jan., No. 4849.

ABYSSINIA : Harar, long.  $42^{\circ} 6'$  E., lat.  $9^{\circ} 18'$  N., 1,920 m., crannies in limestone rocks, Feb., Nos. 5028, 5029.

*A. monanthes* Linn. Mant. Plant. 130 (1767).

ABYSSINIA : Boesesa Valley, long. 42° 18' E., lat. 9° 29' N., 2,160 m., evergreen forest near stream, on limestone, Feb., No. 5176.

*Loxoscaphe theciferum* (H. B. & K.) Moore var. *concinna* (Schrad.) C. Chr. in Dansk Bot. Ark. 7 : 104 (1932). *Asplenium concinnum* (Schrad.) Kuhn.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,280 m., on shaded limestone rock near stream, Feb., No. 5202. Vernac.—*Afar boso*.

*Pellaea calomelanos* (Sw.) Link Fil. Sp. Hort. Berol. 61 (1841) ; *P. hastata* (Thbg.) Prantl.

SOMALILAND : Mt. Rarele, near Buramo, long. 43° 15' E., lat. 10° N., 1,800 m., on mountain top, Dec., No. 4727.

*P. quadripinnata* (Forssk.) Prantl in Engl. Bot. Jahrb. 3 : 420 (1882).

ABYSSINIA : Gara Mulata Mt., long. 41° 48' E., lat. 9° 15' N., 2,700 m., on limestone slopes in burnt *Erica* thickets, Mar., No. 5313.

*Cheilanthes coriacea* Decne. in Arch. Mus. Hist. Nat. Paris 2 : 190 (1841). *Pellaea somarioides* Bak.

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 1,110–1,200 m., in *Buxus* scrub, Oct., No. 4412. Mt. Rarele, near Buramo, long. 43° 15' E., lat. 10° N., 1,740 m., Dec., No. 4732.

*C. farinosa* (Forssk.) Klf. Enum. Fil. 212 (1824).

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,520 m., in rank vegetation seral to *Podocarpus* forest, Feb., No. 5158.

*Adiantum Capillus-Veneris* Linn. Sp. Pl. 1096 (1753).

SOMALILAND : Auboba long. 42° 55' E., lat. 10° 3' N., 1,170 m., by water, Nov., No. 4642.

ABYSSINIA : Geldid, long. 41° 48' E., lat. 9° 15' N., 2,280 m. on damp shaded stones, Mar., No. 5394. Vernac.—*Sarokh*.

*Actiniopteris australis* (Linn. f.) Link Fil. Sp. Hort. Berol. 80 (1841).

SOMALILAND : Hargeisa, long. 44° E., lat. 9° 35' N., 1,410 m., on sandstone rocks, Oct., No. 4261.

*Pteris cretica* Linn. Mant. 130 (1767).

ABYSSINIA : Gara Mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,790 m., in upper evergreen forest with *Hagenia*, Mar., No. 5349. Yuka, long. 41° 40' E., lat. 9° 25' N., 2,280 m., in deep shade of *Podocarpus* forest, Mar., No. 5411.

*P. dentata* Forssk. Fl. Aegypt–Arab. 186 (1775).

ABYSSINIA : Geldid, long. 41° 48' E., lat. 9° 12' N., 2,580 m., damp places in evergreen forest, Mar., No. 5294.

*P. vittata* Linn. Sp. Pl. 1074 (1753).

ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,920 m., in denuded evergreen scrub, Feb., No. 5025.

*Polypodium lanceolatum* Linn. Sp. Pl. 1082 (1753).

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,280 m., shaded limestone rock by stream, Feb., No. 5201.

*Loxogramma lanceolata* (Sw.) Pr. Tent. Pterid. 215 (1836).  
ABYSSINIA: Near Yuka, long.  $41^{\circ} 40'$  E., lat.  $9^{\circ} 25'$  N., in  
*Podocarpus* forest, Mar., No. 5440.

#### LYCOPODIACEAE.

*Lycopodium dacrydioides* Bak. Handbk. Fern Allies 17 (1887).  
ABYSSINIA: Yuka, long.  $41^{\circ} 40'$  E., lat.  $9^{\circ} 25'$  N., 2,130 m.,  
in *Juniperus-Podocarpus* forest, Mar., No. 5425.

#### SELAGINELLACEAE.

*Selaginella imbricata* (Forssk.) Spring ex Dcne. in Arch. Mus.  
Paris 2: 193 (1841-42).

SOMALILAND: Dubriat Mt., long.  $45^{\circ} 10'$  E., lat.  $10^{\circ} 22'$  N.,  
about 210 m., in rock crannies in ravine, Jan., No. 4789.

*S. rupestris* Spring in Mart. Fl. Bras. 1, 2: 118 (1840), (sens. lat.).

SOMALILAND: Libah Hele Range, 4,300 ft., 1 Dec., No. 4681.  
Sigib, 1,290 m., Feb., No. 4681A.

*S. somaliensis* Bak. in Journ. Bot. 1883: 82.

ABYSSINIA: S.E. of Yuka, long.  $41^{\circ} 40'$  E., lat.  $9^{\circ} 25'$  N.,  
2,100-2,550 m., on limestone slopes with *Juniperus* forest, Mar.,  
No. 5405.

#### EQUISETACEAE.

*Equisetum ramosissimum* Desf. Fl. Atlant. 2: 398 (1800).

SOMALILAND: Buramo, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ}$  N., 1,260 m.,  
on bank of large tug with flowing stream, Jan., No. 4874.

#### GYMNOSPERMAE.

##### TAXACEAE.

*Podocarpus gracilior* Pilger—F.T.A. 6, 2: 342.

ABYSSINIA: Galla Pass, long.  $42^{\circ} 19'$  E., lat.  $9^{\circ} 28'$  N., tree,  
dioecious, up to 30 m., circumference of trunk 5.5 m., Feb., No. 5132.  
Vernac.—*Birbirsä*. *Sigibä*.

##### CUPRESSACEAE.

*Juniperus procera* Hochst. ex A. Rich.—F.T.A. 6, 2: 336.

SOMALILAND: Simodi, long.  $43^{\circ} 30'$  E., lat.  $10^{\circ} 5'$  N., 1,740 m.,  
up to 4 m., Nov., No. 4580. Vernac. *Deyib*.

ABYSSINIA: Galla Pass, long.  $42^{\circ} 19'$  E., lat.  $9^{\circ} 28'$  N., 2,100 m.,  
Feb., No. 5109. Vernac.—*Sigibä*. *Deid*.

##### GNETACEAE.

*Ephedra Alie* C. A. Mey.—F.T.A. 6, 2: 329.

SOMALILAND: Berdale Mt., long.  $43^{\circ}$  E., lat.  $10^{\circ} 20'$  N., 1,380-  
1,710 m., shrub up to 2 m., yellow juice, Dec., No. 4682. Vernac.—  
*Aan orle*.

*E. foliolata* Boiss. & Kotschy ex Boiss. Diag. Ser. I, 7: 101 (1846).

Aden: 300 m., 1 m., stems brittle, flowers yellowish, Mar., No. 5509.

## ANGIOSPERMAE.

### *Dicotyledones.*

#### RANUNCULACEAE.

*Ranunculus oreophytus* Del.—F.T.A.: 1: 10.

ABYSSINIA: Kondudo Mt., long. 42° 20' E., lat. 9° 27' N., 2,760 m., near mountain top, in close sward, limestone soil, Feb., No. 5222.

*R. pubescens* Thunb. Prod. Pl. Cap. 94 (1800). *R. pinnatus* Poir.—F.T.A. 1: 9.

ABYSSINIA: Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,580 m., in evergreen forest by stream, limestone, Mar., No. 5355.

*Thalictrum minus* L.—F.T.A. 1: 8.

ABYSSINIA: Kondudo Mt., long. 42° 20' E., lat. 9° 27' N., 2,700 m. (also abundant on Gara mulata Mt. above 2,700 m.); about 1-6 m. high; rootstock bright yellow when cut; leaves glaucous; stamens yellow; style purple; Feb., No. 5214.

#### MENISPERMACEAE.

*Stephania abyssinica* Walp.—F.T.A. 1: 47; F.W.T.A. 1: 74.

ABYSSINIA: Kondudo Mt., long. 42° 20' E., lat. 9° 27' N., 2,730 m., in rank herbage on limestone slopes, flowers dark purple, Feb., No. 5226.

Var. *tomentella* Oliv.—Diels in Engl. Pflanzenr. Menispermac. 270.

ABYSSINIA: Harar—Gobeli road, long. 42° 1' E., lat. 9° 12' N., 1,800 m., flowers greenish, leaves pubescent, Mar., No. 5254.

*Cocculus pendulus* (Forst.) Diels—F.W.T.A. 1: 69.

SOMALILAND: Hargeisa, long. 44° E., lat. 9° 33' N., 1,290 m., climber amongst Acacia trees, flowers greenish, berry red, Sept., No. 3955. Vernac.—*Hayab* or *Malkare*.

#### PIPERACEAE.

*Peperomia abyssinica* Miq.—F.T.A. 6, 1: 153.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,400 m., epiphyte on tree trunks in remnants of Podocarpus forest, inflorescence green, leaves succulent, Feb., No. 5152.—Also in Eritrea.

*P. reflexa* A. Dietr.—F.T.A. 6, 1: 155; F.W.T.A. 1: 80.

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 25' N., 1,980-2,130 m., in lower Juniper-Podocarpus forest on trees or limestone boulders, Mar., No. 5420.

# LOASACEAE.

*Kissenia spathulata* R. Br.—F.T.A. 2 : 501.

ADEN : 150 m., on lava, 1 m. high, flowers white, Mar., No. 5516.—Also in Arabia.

# CAPPARIDACEAE.

*Cleome brachycarpa* (Forssk.) Vahl—F.T.A. 1 : 77 ; Chiov. Fl. Somal. 76.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., viscid plant with yellow flowers, Sept., No. 3976. Vernac.—*Subugeleh* ; Kabalgabat pass, long 43° E., lat. 10° 20' N., 1,080 m., on gneiss rocks, Dec., No. 4687. Vernac.—*Hawar ane* ; Berbera, long. 45° E., lat. 10° 25', sea level, in sandy places, 1 Jan., No. 4739. Aden : 210 m., Mar., No. 5498.

*C. droserifolia* Del.—F.T.A. 1 : 77.

ADEN : 300 m., on lava, viscid herb 30 m. high, flowers pale cream with purple stripes, Mar., No. 5503.—Also in Eastern Sudan, Abyssinia and S. Arabia.

*C. paradoxa* R. Br.—F.T.A. 1 : 78 ; F.W.T.A. 1 : 83.

ADEN : 150 m., on lava, 1 m. high, flowers yellow with crimson veins, crushed leaves very aromatic, Mar., No. 5488.

*C. pruinosa* T. Anders. in Journ. Linn. Soc. 5 : Suppl. p. 3.

ADEN : 150 m., on lava, viscid herb 20 cm. high, flowers yellow, Mar., No. 5502.—Endemic.

*C. scaposa* DC.—Gilg & Benedict in Engl. Bot. Jahrb. 53 : 153 ; F.W.T.A. 1 : 83.

SOMALILAND : near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 900 m., on stony slopes, an aromatic plant with yellow flowers and succulent leaves, Oct., No. 4333.—Also in Eastern Sudan through Arabia to Scind (India).

*C. platysepala* Gilg & Benedict in Engl. Bot. Jahrb. 53 : 161 (1915).

SOMALILAND : between Hargeisa and Aleyalaleh, long. 44° 18' E., lat. 9° 57' N., 810 m., on granite rocks, a small aromatic shrub 1 m. high with pink flowers, Oct., No. 4345.—Endemic.

*Gynandropsis gynandra* (Linn.) Briq. in Ann. Conserv. and Jard. Bot. Genève 17 : 382 (1914). *G. pentaphylla* DC.—F.T.A. 1 : 81.

SOMALILAND : Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., flowers cream, Oct., No. 4125 ; Gorfulai, long. 43° 38' E., lat. 10° 16' N., 540 m., a viscid annual, Nov., No. 4560. Vernac.—*Darjo*, *Aiya*.

*Maerua angolensis* DC.—F.T.A. 1 : 86 ; Gilg & Benedict in Engl. Bot. Jahrb. 53 : 257 ; F.W.T.A. 1 : 84.

SOMALILAND : long. 43° 54' E., lat. 9° 2' N., 1,350 m., slender tree to 10 m., leaves dull green, flowers yellow, Oct., No. 4227 ; Auboba, long. 43° E., lat. 10° 6' N., 1,710–1,800 m., on limestone slopes with *Olea*, *Acokanthera*, etc., Nov., No. 4630. Vernac.—*Ji-eh Lamaloye*.

*M. crassifolia* Forssk.—Gilg & Benedict in Engl. Bot. Jahrb. 53 : 250 ; F.W.T.A. 1 : 84.

SOMALILAND : near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 960 m., on lava slopes, a shrub to 3 m. with cream flowers, Oct., No. 4314. Vernac.—*Ji-eh*.

*M. sessiliflora* Gilg—Gilg & Benedict in Engl. Bot. Jahrb. 53 : 248.

SOMALILAND : Boundary, long. 44° 15' E., lat. 8° 55' N., 1,260 m., in Acacia-Grass veldt, tree to 5 m. with greenish-cream flowers, Sept., No. 4084. Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., No. 4057. Vernac.—*Ji-eh*.—Endemic.

*M. somalensis* Pax—Gilg & Benedict in Engl. Bot. Jahrb. 53 : 259.

SOMALILAND : Biji, long. 44° 5' E., lat. 10° 12' N., 420 m. on sand hills, a shrub to 4 m. with succulent leaves, Oct., No. 4509. Vernac.—*Kalan*.

*M. Hoehneltii* Schweinf.—Gilg & Benedict in Engl. Bot. Jahrb. 53 : 241. *M. campicola* Gilg & Benedict 1. c. 246.

ABYSSINIA : Gafra Valley, long. 42° 13' E., lat. 9° 21' N., 1,500 m., on granite in Acacia scrub or open woodland, bush to 3 m., with green flowers, Feb., No. 5247.

*M. sphacrogyna* Gilg & Benedict in Engl. Bot. Jahrb. 53 : 244.

SOMALILAND : Duwi Pass, long. 44° 15' E. lat., 10° 5' N., 1200 m. in Buxus scrub on south side of ridge, shrub to 2 m. with cream and green flowers, Oct., No. 4376 ; Rarele Mt., long. 43° 15' E., lat. 10° N., 1,800 m., gneiss slopes in transition zone between Acacia open wood and evergreen scrub, Dec., No. 4730. Vernac.—*Gadii*.

*Capparis tomentosa* Lam.—F.T.A. 1 : 96 ; Gilg & Benedict in Engl. Bot. Jahrb. 53 : 189.

ABYSSINIA : Gafra Valley, long. 42° 13' E., lat. 9° 21' N., 1,500 m., on granite slopes in deciduous scrub, fragrant climber with greenish-yellow flowers, Feb., No. 5071. Vernac.—*Gombor*.

*C. galeata* Fresen.—F.T.A. 1 : 95 ; Gilg & Benedict, l.c. 189.

SOMALILAND : near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 930 m., on stony alluvial slopes, a low shrub  $\frac{1}{2}$  m. high, flowers white fading to pink, fruit edible, Oct., No. 4332. Vernac.—*Goa, Goa Kulul*.

*C. Rothii* Oliv.—F.T.A. 1 : 97 ; Gilg & Benedict l.c. 197.

ABYSSINIA : Gafra Valley, long. 42° 13' E., lat. 9° 21' N., 1,500 m., in deciduous scrub, a fragrant climber with cream flowers, Feb., No. 5075. Vernac.—*Gombor*.

*Cadaba farinosa* Forssk.—F.T.A. 1 : 89 ; Gilg & Benedict l.c. 225.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., a bush with grey leaves and greenish flowers tinged with red, very good grazing for all stock, Sept., No. 3958.—Vernac.—*Ditab*.

*C. glandulosa* Forssk.—F.T.A. 1: 89; Gilg & Benedict, l.c. 225.

SOMALILAND: near Eil Demet, long.  $44^{\circ} 17'$  E., lat.  $9^{\circ} 53'$  N., 960 m., on lava slopes facing south, a shrub to  $\frac{1}{2}$  m., flowers greenish with light yellow appendix, seeds bright red, good camel food, Oct., No. 4323. Vernac.—*Dukhul*. Aden: 150–450 m., on lava, Mar., No. 5505.

*C. longifolia* DC.—F.T.A. 1: 90; Gilg & Benedict, l.c. 232.

SOMALILAND: Marmar range, western slopes, long.  $42^{\circ} 47'$  E., lat.  $10^{\circ} 28'$  N., 1,050 m., on mountain slopes in open scrub with *Commiphora*, a shrub to 3 m. with cream flowers, Nov., No. 4659. Vernac.—*Aina ma ais*, *Ji-eh*. Aden: 150–300 m., on lava, Mar., No. 5489.—Also in Eritrea and S. Arabia.

*C. heterotricha* Stocks—Gilg & Benedict, l.c. 228.

SOMALILAND: Between Burmado and Goton, long.  $43^{\circ} 16'$  E., lat.  $10^{\circ} 1'$  N., 1,020 m., on limestone hills in lower Tree-Acacia open wood, a tree to 5 m. widespread but nowhere abundant; trunk may become quite large, bark grey, smooth, flowers white, Nov., No. 4599. Vernac.—*Higlu*.—Also in S. Arabia east to Scind.

*Boscia coriacea* Pax—Gilg & Benedict, l.c. 211.

SOMALILAND: Harerat, long.  $42^{\circ} 49'$  E., lat.  $10^{\circ} 21'$  N., 990 m., on limestone rocks, shrub 2 m., flowers greenish, Nov., No. 4645. Vernac.—*Galangal*, *Etinabi*.

*B. minimifolia* Chiov. Miss. Stefan.—Paoli Somal. Ital. 19, t. 3, fig. A.

SOMALILAND: long.  $44^{\circ} 10'$  E., lat.  $8^{\circ} 57'$  N., 1,260 m., in Acacia-Grass veldt on deep red soil, also in *Commiphora* formation, a tree 3–4 m. with yellow flowers and grey leaves, Sept., No. 4094. Vernac.—*Megag*.—Endemic.

*Courbonia decumbens* A. Brogn.—F.T.A. 1: 88; Gilg & Benedict, l.c. 222.

SOMALILAND: Elmis, long.  $44^{\circ} 14'$  E., lat.  $10^{\circ} 22'$  N., 50–6004 m., on mountain slopes among *Commiphora* and open scrub, a shrub to 1 m., Oct., No. 4499. Vernac.—*Schifawēn*.

*C. virgata* A. Brogn.—F.T.A. 1: 88; Gilg & Benedict, l.c. 217.

SOMALILAND: Duwi, long.  $44^{\circ} 15'$  E., lat.  $10^{\circ} 5'$  N., 990 m., on rocky slopes, a shrub to 1 m. with cream flowers, Oct., No. 4389.—Vernac.—*Schifawēn*.

#### MORINGACEAE.

*Moringa aptera* Gaertn.—F.T.A. 1: 101.

SOMALILAND: Elmis, long.  $44^{\circ} 14'$  E., lat.  $10^{\circ} 20'$  N., 240 m., on lava slopes, shrub 4 m., stem very brittle, Oct., No. 4488. Vernac.—*Dumōk*.

#### CRUCIFERAE.

*Matthiola dimolehensis* Bak. f. in Journ. Bot. 1898: 2.

SOMALILAND: Biyo gora, long.  $45^{\circ} 8'$  E. lat.  $10^{\circ} 25'$  N., 90 m., in sandy bed of tug, herb with mauve flowers, Jan., No. 4830—Endemic.

*M. elliptica* R. Br. ex DC.—F.T.A. 1: 57.

SOMALILAND: near Eil Demet, long.  $44^{\circ} 17'$  E., lat.  $9^{\circ} 53'$  N., 960 m., on lava rocks, shrublet up to 30 cm. high with white flowers, Oct., No. 4318. Vernac.—*Aho*; Goton E., long.  $42^{\circ} 54'$  E., lat.  $10^{\circ} 9'$  N., 1,350 m., on limestone crags, Nov., No. 4638. Vernac.—*Geldabar*.

*Farsetia grandiflora* Fourn.—F.T.A. 1: 62.

SOMALILAND: Buramo, Warieto tug, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ} 2'$  N., 1,290 m., on rocky gneiss slope in Acacia open wood—evergreen scrub, flowers pale yellowish-brown, Jan., No. 4896.

Boundary Pillar 93, long.  $45^{\circ} 9'$  E., lat.  $8^{\circ} 37'$  N., 990 m., flowers white, Oct., No. 4222. Vernac.—*Iba ror*.

*F. longisiliqua* Decne.—F.T.A. 1: 62.

SOMALILAND: Near Haili tug, long.  $45^{\circ} 20'$  E., lat.  $10^{\circ} 22'$  N., 210 m., on sub desert or eocene limestone slopes, about 1 m. high with greenish cream flowers, Jan., No. 4815. Vernac.—*Mero dameta*, *Aseye*.

Elmis, long.  $44^{\circ} 14'$  E., lat.  $10^{\circ} 22'$  N., 300–600 m., in *Commiphora* and open scrub on mountain slope, slender shrub to 2 m. high, 29 Oct., No. 4498. Aden, 150 m., flowers white, Mar., No. 5518.

*F. longistyla* Baker in Kew Bull. 1895: 211.

SOMALILAND: Debrawen, long.  $42^{\circ} 49'$  E., lat.  $10^{\circ} 26'$  N., 960 m., in bare sandy bed of tug near permanent water, flowers lilac, Nov., No. 4670. Dubriat Mt., 150 m., long.  $45^{\circ} 10'$  E., lat.  $10^{\circ} 22'$  N., Jan., No. 4781. Biji, long.  $44^{\circ} 5'$  E., lat.  $10^{\circ} 12'$  N., 540 m., on the top of schist mountain, in *Commiphora* and open scrub, Oct., No. 4506. Vernac.—*Lanagar*.—Endemic.

*F. ramosissima* Hochst.—F.T.A. 1: 63.

SOMALILAND: Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,290 m., limestone escarpment, flowers yellow, Sept., No. 3973; Dubriat Mt., long.  $45^{\circ} 10'$  E., lat.  $10^{\circ} 22'$  N., 300 m., Jan., No. 4786; Buramo, long.  $42^{\circ} 10'$  E., lat.  $10^{\circ}$  N., 1,500 m., Jan., No. 4852.

*F. somalensis* (Pax) Engl. Bot. Jahrb. 53: 169.

*Cleomodendron somalense* Pax in Bericht. Deutsch. Bot. Geselsch. 9: 32 (1891). *F. fruticosa* Engl. in Ann. Ist. Bot. Roma 9: 249 (1902).

SOMALILAND: Ali Wein Mt., long.  $45^{\circ} 15'$  E., lat.  $10^{\circ} 24'$  N., 600 m., limestone slopes on rocks in open scrub, a small shrub about  $\frac{1}{2}$  m. high, flowers white, Jan., N. 4821.—Endemic.

*F. sp.*

SOMALILAND: Ali Wein Mt., long.  $45^{\circ} 15'$  E., lat.  $10^{\circ} 24'$  N., 600 m., in open scrub on rocky limestone slopes, about 30 cm. high with white flowers, Jan., No. 4822.—Material not sufficient for description.

*Nasturtium officinale* (Linn.) R.Br.—F.T.A. 1: 58.

ABYSSINIA: Boesesa valley, long.  $42^{\circ} 18'$  E., lat.  $9^{\circ} 29'$  N., 2,040 m., in small stream; flowers white, Feb., No. 5174.—Vernac. *Mukerafo*. The Common Watercress.



*Cardamine africana* Linn.—F.T.A. 1 : 60.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,250–3,000 m., on limestone in damp places, flowers cream, Mar., No. 5291.

*Arabis albida* Stev. in DC. Syst. Veg. 2 : 217.

ABYSSINIA : Kondudo Mt., long.  $42^{\circ} 20'$  E., lat.  $9^{\circ} 27'$  N., 2,640–2,790 m., on limestone slopes, herb to 30 cm. with white flowers, Feb., No. 5207.

*Diceratella sinuata* (Franch.) Oliv. in James and Thrupp, Unknown Horn of Africa, 318 (1888) ; Chiov. Fl. Somal. 75.

SOMALILAND : Boundary, long.  $44^{\circ} 15'$  E., lat.  $8^{\circ} 58'$  N., 1,260 m., shallow soil in *Acacia Bussei* association, flowers pale mauve or white, Sept., No. 4105. Hargeisa, long.  $44^{\circ}$  E., lat.  $9^{\circ} 33'$  N., 1,290 m., level ground in Tree-Acacia formation, flowers mauve, Sept., No. 3933. Buramo, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ}$  N., 1,260 m., in the gorge of a large tug, herb 20 cm. high with dark purple flowers, Jan., No. 4879.—Also in Socotra.

*Erucastrum abyssinicum* (A. Rich.) O. E. Schulz in Engl. Bot. Jahrb. 54 : Beibl. 119 : 56 (1916), et in Engl. Pflanzenr. 4, 105 : 98.

ABYSSINIA : Yuka, long.  $41^{\circ} 40'$  E., lat.  $9^{\circ} 25'$  N., 2,130 m., on shingle by stream, in open place in *Podocarpus* forest ; herb with yellow flowers, March, No. 5414. Vernac.—Gomanza.

*Dipterygium glaucum* Decne—F.T.A. 1 : 73.

SOMALILAND : Elmis, long.  $44^{\circ} 14'$  E., lat.  $10^{\circ} 20'$  N., 230 m., sandy plain, suffruticose, fls. yellow, Oct., No. 4491. Vernac.—*Sar asēs*.—Also in Nubia, Arabia and N.W. India.

*Sisymbrium Irio* Linn.—F.T.A. 1 : 64.

SOMALILAND : Buramo, long.  $44^{\circ} 10'$  E., lat.  $10^{\circ} 2'$  N., 1,290 m., steep rocky slopes, fls. yellow, Jan., No. 4895.

#### VIOLACEAE.

*Viola abyssinica* Steud.—F.T.A. 1 : 105 ; F.W.T.A. 1 : 97.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,850 m., fls. white, spur and throat yellow, with blue lines on lower petal, Mar., No. 5330.

#### RESEDACEAE.

*Reseda ambylocarpa* Fresen. in Mus. Denckenb. 2 : 108 (1837).

ADEN : sea level to 450 m., on lava slopes coming down to the sea, flowers pale yellow, Mar., No. 5482.

*R. bracteata* Boiss. Diagn. Ser. I. 6 : 22 (1842).

SOMALILAND : between Hargeisa and Aleyalaleh, long.  $44^{\circ} 17'$  E., lat.  $9^{\circ} 55'$  N., 900 m., fls. cream, Oct., No. 4336. Vernac.—*Kahiye*.

*R. oligomeroïdes* Schinz in Bull. Herb. Boiss. 3 : 397 (1895).

SOMALILAND : Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,290 m., fls. cream, Sept., No. 4019. Berbera, long.  $45^{\circ}$  E., lat.  $10^{\circ} 25'$  N., in sand overlying coral rock, Jan., No. 4757. Vernac.—*Kahiye*.

*Ochradenus baccatus* Del.—F.T.A. 1: 104.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 870 m., small shrub 1 m. high; fls. yellow, in open scrub on rocky slopes, Oct., No. 4393. Vernac.—*Miru*.

*O. somalensis* Bak. f. in Journ. Bot. 1896: 52.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., open ground, fls. yellow green, eaten by camels, Sept., Nos. 3953; 3981. Vernac.—*Gosa mudoweyi*.—Endemic.

#### POLYGALACEAE.

*Polygala abyssinica* Fres.—F.T.A. 1: 130; Chodat, Monogr. Polygalac., 388.

SOMALILAND: Barataga, long. 44° 1' E., lat. 10° 5' N., 1,290 m., grassy slopes amongst *Buxus*, calyx green, petals purple, Oct., No. 4517; Buramo, Dumuk tug, long. 43° 12' E., lat. 10° 1' N., 1,200 m., in gneiss gorge of tug,  $\frac{1}{2}$  m. high, Jan., No. 4882.

ABYSSINIA: Harar, long. 42° 6' E., lat. 9° 18' N., 1,920 m., Feb., No. 5013.

*P. erioptera* D.C.—Chodat, l.c. 342.

SOMALILAND: Burmado, long. 43° 50' E., lat. 10° 13' N., 960 m., shady side of mountain top, calyx green, petals crimson, Nov., No. 4542; Buramo, Warieto tug, long. 43° 10' E., lat. 10° 2' N., 1,080 m., on gneiss hills in Acacia open wood, Jan., No. 4911.

*P. Hagerupii* Exell in Journ. Bot. 1930: 244. *P. obtusata* Guil. & Perr. non DC.

SOMALILAND: Berbera, sandy and shingly plain, 1 Jan., No. 4756. Aden: 210 m., on lava, Mar., No. 5490. Vernac.—*El Asti* (Somali).

*P. obtusissima* Hochst. ex Chodat, Monogr. Polygalac. 322 (1891). *P. calcicola* Chodat in Chodat Monogr. Polygalac. p. 326 (1891).

SOMALILAND: on the Abyssinia-Somaliland Boundary, long. 44° 15' E., lat. 8° 55' N., 1,260 m., in shady places among *Acacia* and on the grass veldt, flowers pink, Sept., No. 4085; Buramo, Warieto tug, long. 43° 10' E., lat. 10° 2' N., 1,080 m., smaller petals crimson, large outer ones yellow veined with crimson, rest of flower green, Jan., No. 4913. Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., Sept., No. 4219.

*P. Quartiniana* A. Rich. in Ann. Sci. Nat. Ser. ii. 14: 263 (1840); Chodat, l.c. 328.

SOMALILAND: Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., fls. green and crimson, Oct., No. 4120.

ABYSSINIA: Yuka, 1,980 m., evergreen scrub on steep limestone slopes, Mar., No. 5453.

*P. Steudneri* Chodat, l.c. 390.

ABYSSINIA: Kondudo Mt., 2,760 m., long. 42° 20' E., lat. 9° 27' N., rocky mountain top, flowers pale crimson with dark veins, Feb., No. 5219.

CRASSULACEAE.

*Crassula abyssinica* A. Rich.—F.T.A. 2 : 388.

ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,700 m., in Juniperus-Podocarpus forest on steep limestone slopes, fls. rose-white, stem reddish succulent, Mar., No. 5345.

*C. alsinoides* (Hook. f.) Engl.—F.W.T.A. 1 : 103.

ABYSSINIA : Geldid, long. 41° 48' E., lat. 9° 12' N., 2,520 m., in ravines and light evergreen forest on damp shaded soil, flowers white, leaves succulent, Mar., No. 5287.

*C. galunkensis* Engl. Bot. Jahrb. 39 : 468 (1907).

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 1,200 m., on Basalt rocks in Buxus scrub, succulent, flowers white, Nov., No. 4413.

*C. rivularis* (Peter) Hutch. & E. A. Bruce, comb. nov. Tillaea rivularis Peter. C. Wrightiana Bullock.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,340 m., on border of lake, limestone, flowers mauve with darker centre, Mar., No. 5137.

*Kalanchoe diversa* N.E. Br. in Gard. Chron. 1902, 2 : 210.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., on alluvium, flowers orange, Oct., No. 4235. Vernac.—*Mantera*.—Endemic.

*K. lanceolata* Pers. Synop. 1 : 446 (1805). *K. glandulosa* Hochst.—F.T.A. 2 : 396.

SOMALILAND : near Daba Bur, long. 43° 6' E., lat. 9° 59' N., 1,470 m., in tree Euphorbia wood in deep soil, flowers orange, Nov., No. 4614. Vernac.—*Bibile*.

*K. Quartiniana* A. Rich.—F.T.A. 2 : 391.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 25' N., 2,340 m., on limestone, flowers pink, 22 Feb., No. 5129. Vernac.—*Lugo*.—Endemic.

*K. somaliensis* Baker in Kew Bull. 1895 : 214, et ex Hook. f. Bot. Mag. t. 7831 (1902).

SOMALILAND : Hargeisa, 1,260 m., in shade of Acacias, leaves whitish, flowers cream, to  $\frac{1}{2}$  m. high, Sept., No. 4068. Vernac.—*Wahara bifiye*.

*K. stenosphon* Britten—F.T.A. 2 : 395.

SOMALILAND : Buramo-Warieto tug, long. 43° 10' E., lat. 10° 2' N., 1,080 m., on alluvium with Sansevieria, in Acacia association, flowers salmon, leaves succulent, 1 m. high, Jan., No. 4905.

*K. citrina* Schweinf. in Engl. Pflanzenw. Afrikas 3, 1 : 285 (1915).

SOMALILAND : 20 m. S. of Hargeisa, long. 44° E., lat. 9° 20' N., 1,380 m., in tree Acacia-Aloe-Grass country, flowers cream, Oct., No. 4232. Vernac.—*Mantera*.—Also in Eritrea and Arabia.

*Umbilicus botryoides* Hochst.—F.W.T.A. 1 : 105.

SOMALILAND : Mt. Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,620 m., beneath Junipers, Feb., No. 4989.—Also in Mts. of Abyssinia and Uganda, and on Cameroons Mt.

*Cotyledon Barbeyi* Schweinf. ex Penzig in Att. Congr. Bot. Genev. 1893 : 341.

SOMALILAND : Simodi, long.  $43^{\circ} 30'$  E., lat.  $10^{\circ} 5'$  N., 1,500–1,740 m., on mt. slopes in scattered *Buxus-Acokanthera* scrub, 1.5 m. high, leaves whitish, flowers drooping, pale yellow, Nov., No. 4571. Vernac.—*Mtera*.

*Sempervivum leucoblepharum* (Webb ex A. Rich.) Hutch. & E. A. Bruce, comb. nov. *Aeonium leucoblepharum* Webb ex A. Rich. Fl. Abyss. 1 : 314 (1847). *S. chrysanthum* Hochst.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,760 m., on limestone cliffs and sometimes epiphytic on trees, flowers yellow, leaves red tinged, Mar., No. 5363.

#### CARYOPHYLLACEAE.

*Arenaria Schimper* (Hochst.) Oliv. F.T.A. 1 : 142.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,910 m., on limestone rocks, fls. white, Mar., No. 5314.

*A. serpyllifolia* L.—F.T.A. 1 : 142.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,640 m., Mar., No. 5342.

SOMALILAND : Dobo Pass, long.  $44^{\circ} 15'$  E., lat.  $10^{\circ} 15'$  N., 1,200 m., in shady crannies, fls. white, Feb., No. 4972.

*Cerastium africanum* Oliv.—F.W.T.A. 1 : 110.

ABYSSINIA : Kondudo Mt., long.  $42^{\circ} 20'$  E., lat.  $9^{\circ} 27'$  N., 2,700 m., fls. white, Feb., No. 5215.

*Gypsophila montana* Balf. f. in Proc. Roy. Soc. Edinb. 11 : 501 (1882).

ADEN : 150 m., on lava, flowers white, Mar., No. 5504.—Also in S. Arabia and Socotra.

*Silene chirensis* A. Rich. Fl. Abyss. 1 : 44 (1847)—F.T.A. 1 : 139, sub *S. Burchellii*.

ABYSSINIA : Yuka, long.  $41^{\circ} 40'$  E., lat.  $9^{\circ} 25'$  N., 2,250 m., open grass scrub, flowers cream to pink, Mar., No. 5436.

*S. flammulifolia* Steud.—F.T.A. 1 : 139.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,730 m., limestone rocks, Mar., No. 5306—Also in Eritrea and Arabia.

#### MOLLUGINACEAE.

*Gisekia pharnaceoides* Linn.—F.T.A. 2 : 593 ; F.W.T.A. 1 : 113.

SOMALILAND : Duwi, long.  $44^{\circ} 15'$  E., lat.  $10^{\circ} 5'$  N., 840 m., on bare sand in valley, flowers white, Oct., No. 4428 ; Afard, 540 m., Oct., No. 4459 ; Weranwis valley, 750 m., Nov., No. 4534 ; Dobo Pass, 1,200 m., Feb., No. 4955.

*Mollugo Cerviana* Seringe—F.T.A. 2 : 591 ; F.W.T.A. 1 : 114.

SOMALILAND : Gorfulai, long.  $43^{\circ} 38'$  E., lat.  $10^{\circ} 16'$  N., 540 m., in sandy bed of tug, flowers pale, Nov., No. 4559.

*Orygia decumbens* Forssk.—F.T.A. 2 : 589.  
SOMALILAND : Junction of tugs, long.  $44^{\circ} 18' E.$ ,  $9^{\circ} 57' N.$ ,  
810 m., stony bed of tug, flowers crimson, Oct., No. 4349.

#### FICOIDACEAE.

*Trianthema pentandra* Linn.—F.T.A. 2 : 588 ; F.W.T.A. 1 : 115.  
SOMALILAND : Boundary, long.  $44^{\circ} 10' E.$ , lat.  $8^{\circ} 57' N.$ ,  
1,290 m., Oct., No. 4128 ; Buramo-Warieto tug, 1,080 m., Feb.,  
No. 4920.

*T. crystallinum* Vahl—F.T.A. 2 : 587.  
SOMALILAND : Berbera, sea level, on sand by the sea, flowers  
yellow, Jan., No. 4744. Vernac.—*Daran ad.*

#### PORTULACACEAE.

*Portulaca oleracea* Linn.—F.T.A. 1 : 148 ; F.W.T.A. 1 : 116.  
SOMALILAND : Boundary 7 miles W. of long.  $43^{\circ} 54' E.$ , lat.  
 $9^{\circ} 2' N.$ , 1,350 m., succulent, flowers yellow, Oct., No. 4225. Hargeisa,  
1,290 m., Oct., No. 4238. Vernac.—*Aiyo*.

*P. quadrifida* Linn.—F.T.A. 1 : 49 ; F.W.T.A. 1 : 116.  
SOMALILAND : boundary, long.  $44^{\circ} 10' E.$ , lat.  $8^{\circ} 57' N.$ , 1,290 m.,  
flowers yellow, Oct., No. 4137. Near Eil Demet, long.  $44^{\circ} 17' E.$ ,  
lat.  $9^{\circ} 53' N.$ , 930 m., on stony ground, Oct., No. 4303. Afard,  
long.,  $44^{\circ} 8' E.$ , lat.  $10^{\circ} 10' N.$ , 600 m., on stony slopes, Oct., No.  
4476. Dobo Pass, long.  $43^{\circ} 15' E.$ ,  $10^{\circ} 15' N.$ , 1,200 m., open wood,  
Feb., No. 4961. Vernac.—*Hadu as, Dananiso*.

*P. somalica* N.E. Br. in Gard. Chron. 1886, 2 : 134.  
SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m.,  
in bare alluvium, flowers yellow, 25 Sept., No. 4049. Afard, long.  
 $44^{\circ} 8' E.$ , lat.  $10^{\circ} 8' N.$ , 960 m., in stony place in open Acacia wood,  
flowers yellow, 25 Oct., No. 4466. Vernac.—*Hadu Sagaro, Dan  
aniso*. Endemic.

*P. Wightiana* Wall. Cat. N. 6845 ; Fl. Brit. Ind. 1 : 247 (1874).  
SOMALILAND : Afard, No. 4462.—Also in Madras ; a new record  
for Africa.

#### POLYGONACEAE.

*Polygonum acuminatum* H.B. & K.—F.T.A. 6. 1 : 112 ;  
F.W.T.A. 1 : 120.

ABYSSINIA : Galla Pass, long.  $42^{\circ} 19' E.$ , lat.  $9^{\circ} 28' N.$ , 2,340 m.,  
on limestone, flowers pink, Feb., No. 5138. Harar, long.  $42^{\circ} 10' E.$ ,  
lat.  $9^{\circ} 20' N.$ , 1,740 m., on granite in stream bed, flowers white  
touched with pink, Feb., No. 5035.

*P. senegalense* Meisn.—F.T.A. 6, 1 : 111 ; F.W.T.A. 1 : 120.  
ABYSSINIA : Harar, long.  $42^{\circ} 10' E.$ , lat.  $9^{\circ} 20' N.$ , 1,740 m.,  
on granite in a stream bed, flowers pink, Feb., No. 5036.

SOMALILAND : Buramo, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} N.$ , 1,260 m.,  
Jan., No. 4876.

*Rumex nepalensis* Spreng.—F.T.A. 6, 1: 117; F.W.T.A. 1: 120.

ABYSSINIA: Galla Pass, long. 42° 9' E., lat. 9° 28' N., 2,250 m., flowers dark red, Feb., No. 5164. Vernac.—*Arab-sari*.

*R. nervosus* Vahl.—F.T.A. 6, 1: 116.

ABYSSINIA: Harar, long. 42° 6' E., lat. 9° 18' N., 1,920 m., on limestone, weak ascending shrub, flowers pale green flushed with red, Feb., No. 5027.

*Oxygonum atriplicifolium* Martelli var. *sinuatum* Baker—F.T.A. 6, 1: 101.

SOMALILAND: Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,200 m., on Gneiss in Acacia open wood, flowers pink, leaf margin and stem base red, Feb., No. 4951.

#### ILLECEBRACEAE.

*Cometes abyssinica* R. Br.—F.T.A. 6, 1: 14.

ADEN: 1,500 ft., fls. green, Mar., No. 5,487.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 35' N., 1,410 m., on sandstone, flowers pale, Sept., No. 4027.

*Corrigiola litoralis* Linn.—F.T.A. 6, 1: 12.

ABYSSINIA: Mulka jibri, long. 42° 16' E., lat. 9° 24' N., 1,620 m., on sand by stream, flowers green and white, Feb., No. 5080. Vernac.—*Moka ija*.

*Pollichia campestris* Ait.—F.T.A. 6, 1: 10.

SOMALILAND: Mt. Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,530 m., on gneiss rock in shade of Junipers, flowers greenish, Feb., No. 4984.

#### PHYTOLACCACEAE.

*Phytolacca dodecandra* L'Hérit.—F.T.A. 6, 1: 97; F.W.T.A. 1: 121.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,250 m., usually near houses, Feb., No. 5165. Vernac.—*Ndod*.

#### CHENOPODIACEAE.

*Chenopodium Botrys* Linn.—F.T.A. 6, 1: 79.

ABYSSINIA: Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,670 m., in Juniper-Podocarpus forest on steep limestone slopes, flowers yellow green, Mar., No. 5343.

*C. murale* Linn.—F.T.A. 6, 1: 78.

SOMALILAND: Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., 2 Oct., No. 4132.—Vernac.—*Aiyu Guri*.

*C. opulifolium* Schrad.—F.T.A. 6, 1: 78.

SOMALILAND: Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., Oct., No. 4129.

*Suaeda fruticosa* Forssk.—F.T.A. 6, 1: 91.

SOMALILAND: Kabri Bahr, long. 43° 44' E., lat. 10° 20' N., 450 m., on fringe of Tamarix thicket, shrub to 2 m., flowers green, leaves succulent, Nov., No. 4544. Berbera, sea level, sand or mud by the sea, Jan., No. 4743. Vernac.—*Hodon*.

*S. vermiculata* Forssk.—F.T.A. 6, 1: 92.

SOMALILAND: Berbera, 0.4 m., fls. green, Jan., No. 4746.  
Vernac.—*Dinas*.

*Salsola Bothae* Boiss.—F.T.A. 6, 1: 90; Blatter, Flora of Aden, 312. Aden: 210 m., on lava in sub-desert, small shrub to 30 cm., flowers greenish, Mar., No. 5477; SOMALILAND: Hargeisa, 1,290 m., on alluvium, Sept., No. 4062; Berbera, 30 m., on shingly plain, stems glaucous, Jan., No. 4760. Debrawen, 990 m., Feb., No. 4939. Vernac.—*Goso mudo weyi*, *Mirgi edalis* (Somali).—Also in S. Arabia.

*S. crassa* M.Bieb.—F.T.A. 6, 1: 88.

SOMALILAND: Dubar, long. 45° 5' E., lat. 10° 20' N., 300 m., shrublet 40 cm., whitish, Jan., No. 4767. Vernac.—*Habugh*.

*S. foetida* Del.—F.T.A. 6, 1: 87.

SOMALILAND: Duwi pass, long. 44° 15' E., lat. 10° 5' N., 1,050 m., in tree Acacia-grass community, small shrub 4 m., flowers white tinged with pink, Oct., No. 4372. Vernac.—*Gulan*.

*Pleuropterantha Revoilii* Franch. in Revoil Pays Comalis 59, t. 5 (1882).

SOMALILAND: Hargeisa, 1,290 m., by small tug, flowers cream, Sept., No. 3988; Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., Oct., No. 4207; Junction of tugs, long. 44° 18' E., lat. 9° 57' N., 810 m., on granite rocks, Oct., No. 4348; Weranwis Valley, long. 43° 50' E., lat. 10° 15' N., 480 m., in open Commiphora scrub, wings of fruit reddish, root used as soap, Nov., No. 4529; Berbera, sea level, sandy places near the sea, flowers white and purplish, Jan., No. 4745; Hills west of Wadi Haiti, long. 45° 20' E., lat. 10° 22' N., 230 m., shrub 1.5 m., Jan., No. 4814. Vernac.—*Ged Hajin*, *Iber ror*, *Ul as*.—Endemic.

*Saltia papposa* (Forssk.) Moq.—Blatter, Flora of Aden, 301 (1915).

ADEN: 150–450 m., on lava, a shrub 2 m. high, flowers whitish, Mar., No. 5491.—Also in S. Arabia.

#### AMARANTHACEAE.

*Celosia populifolia* Moq.—F.T.A. 6, 1: 24.

SOMALILAND: Afard, long. 44° 8' E., lat. 10° 10' N., 600 m., among rocks in Commiphora bush, shrub 2 m., flowers dull red, Oct., No. 4475. Vernac.—*Ged lalis*.

*Amaranthus oleraceus* Linn.—F.T.A. 6, 1: 34; F.W.T.A., 1: 125.

SOMALILAND: Buramo Varieto tug, 1,080 m., Feb., No. 4919a.

*A. graecizans* Linn.—F.T.A. 6, 1: 34.

With above, No. 4919b.

*Aerva lanata* Juss.—F.T.A. 6, 1: 39.

SOMALILAND: Jalelo, long. 44° 14' E., lat. 9° 45' N., 1,080 m., on schist rocks, flowers greenish, Oct., No. 4295; Aden, 210 m., on lava slopes in sub-desert, Mar., No. 5478.

*A. tomentosa* Forssk.—F.T.A. 6, 1: 37; F.W.T.A. 1: 125.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., in tree-Acacia formation, Sept., No. 3932; Debrawen, long. 42° 49' E., lat. 10° 26' N., 930 m., Nov., No. 4649; 4650. Vernac.—*Sorna* or *Wanad*.

*Pupalia lappacea* Juss.—F.T.A. 6, 1: 47; F.W.T.A. 1: 127.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., level ground among aloes and in tree-Acacia formation, flowers white, Sept., No. 3938. Vernac.—*Marabob*.

*Psilotrichum gnaphalobryum* (Hochst.) Schinz in Engl & Prantl Pflanzenfam. 16 c: 60 (1934).

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 840 m., climber, flowers cream, Oct., No. 4392.

*Psilotrichum gracilipes* Hutch. et E. A. Bruce, sp. nov. affinis *P. gnaphalobryo* (Hochst.) Schinz, sed floribus longe et graciliter pedicellatis facile distinguitur.

Herba basi lignosa, circiter 25 cm. alta; caules molliter tomentosi. *Folia* anguste lanceolata ad ovata, apice subacuta, basi in petiolum sensim angustata, 2.5–4 cm. longa, usque ad 1.3 cm. lata, utrinque breviter pubescentia, juniora sericea; nodi longe pilosi. *Inflorescentia* laxe paniculata, ramis et ramulis gracilibus glabrescentibus ad angulos 45° patentibus; bracteae lineares, virides, usque ad 2 cm. longae; pedicelli gracillimi, usque ad 1.5 cm. longi, plerumque apice florem rudimentarium gerentes; bracteolae 2, late ovato-triangularae, uninerviae, hyalinae, 1 mm. longae. *Sepala* elliptico-lanceolata, apice subacuta, 3-nervia, 3 mm. longa, 1–1.25 mm. lata, patule pubescentia. *Filamenta* 1 mm. longa; antherae 0.15 mm. longae. *Ovarium* late ovoideum, glabrum; stylus 0.75 mm. longus.

SOMALILAND: Debrawen, long. 43° 10' E., lat. 10° 5' N., 1,020 m., on stony limestone hill, flowers dull red, 4 Feb., No. 4937 (type in Kew Herb.).

*Sericocomopsis pallida* (C.B.Cl.) Schinz. in Engl. Bot. Jahrb. 21: 185 (1895). *Cyphocarpa pallida* C.B.Cl.—F.T.A. 6, 1: 54.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., level ground near tug in shelter of aloes,  $\frac{1}{2}$  m. high, flowers white, Sept., No. 3935. Boundary Pillar 93, No. 4214. Vernac.—*Harbo*.

*Achyranthes aspera* Linn.—F.T.A. 6, 1: 63; F.W.T.A. 1: 128.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., level ground near tug in shade of Acacias, flowers reddish, Sept., No. 3924.

#### LINACEAE.

*Linum usitatissimum* Linn.—F.T.A. 1: 269.

ABYSSINIA: Mulka jibri, long. 42° 16' E., lat. 9° 24' N., 1,620 m., flowers blue, Feb., No. 5076.



# ZYGOPHYLLACEAE.

*Tribulus cistoides* Linn.—DC. Prod. 1 : 703 (1824). *Tribulus terrestris* var. *cistoides*.—F.T.A. 1 : 284.

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 840 m., in grazed valley, a prostrate herb with yellow flowers, Oct., No. 4430 ; Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Sept., No. 3975. Vernac.—*Go-ondo*.

*T. mollis* Ehrenb. in Schweinf. Fl. Aethiop. 29 (1867).

SOMALILAND : Berbera, on sandy plain, a prostrate herb with pale yellow flowers, Jan., No. 4747. Vernac.—*Gahad*.

*T. terrestris* Linn.—F.T.A. 1 : 283 ; F.W.T.A. 1 : 136, fig. 53.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., prostrate plant with yellow flowers, Sept., No. 3970. Vernac.—*Gohondo*.

*Zygophyllum Hildebrandtii* Engl. in Ann. Inst. Bot. Roma 7 : 15 (1897).

SOMALILAND : Las Dawan, long. 45° 12' E., lat. 10° 20' N., 180 m., in sub-desert especially near tugs, a shrub to 2 m., with pink flowers, Jan., No. 4809. Vernac.—*Bal ad*.—Endemic.

*Z. simplex* Linn.—F.T.A. 1 : 285 ; Chiov. Fl. Somal. 110.

SOMALILAND : near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 990 m., on sandy soil between lava rocks, prostrate herb with yellow flowers, Oct., No. 4317.

ADEN : 150 m., on lava, Mar., No. 5515. Vernac.—*Kabogh hois* (Somal.).

*Fagonia Bruguieri* DC. Prodr. 1 : 704 (1824)—for synonymy see Hutch. in Kew Bull. 1931 : 164.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., on aeroplane ground, flowers pink, Sept., No. 3978. Vernac.—*Gori-e ka halis*, *Anan ad*.

*F. parviflora* Boiss.—Diagn. Ser. I, 8 : 124 (1849).

ADEN : 150 m., on lava, plant with pink flowers and sub-succulent leaves, Mar., No. 5520.

*F. sinaica* Boiss.—Diagn. Ser. I, 1 : 61 (1842).

SOMALILAND : Dubriat Mt., long. 45° 10' E., lat. 10° 22' N., 150–420 m., limestone slopes, flowers pink, stipules spiny, plant rather viscid, Jan., No. 4793.—First record for Tropical Africa.

*Kelleronia Gilletii* Bak. f. in Journ. Bot. 1898 : 6.

SOMALILAND : Las Dawan, long. 45° 12' E., lat. 10° 20' N., 180 m., on stony slopes in lower open scrub, a slender shrub to 1.5 m., flowers a brilliant copper colour, bell-shaped, Jan., No. 4813. Dubriat Mt., long. 45° 10' E., lat. 10° 22' N., 210 m., in limestone ravines, a shrub to 2 m., with bright glossy yellow flowers 5 cm. in diameter, Jan., No. 4788. Vernac.—*Mija aseye*.—Endemic.

# GERANIACEAE.

*Monsonia biflora* DC.—F.T.A. 1 : 290.

SOMALILAND : Rarele Mt., near Buramo, long. 43° 15' E., lat. 10° N., 1,800 m., among grass on gneiss slopes, flowers pale lilac or pink, Dec., No. 4731.

*Geranium simense* Hochst.—F.T.A. 1: 291; F.W.T.A. 1: 138.  
ABYSSINIA: Kondudo Mt., long. 42° 20' E., lat. 9° 27' N., 2,640 m., on limestone, creeping herb, flowers pale pink, Feb., No. 5213.

*Pelargonium glechomoides* A. Rich.—F.T.A. 1: 294.

SOMALILAND: Simodi, long. 43° 30' E., lat. 10° 5' N., 1,500–1,740 m., in *Buxus-Acokanthera* scrub, flowers pink with crimson line, Nov., No. 4569. Vernac.—*Berdid*.

*P. multibracteatum* Hochst. ex A. Rich.—F.T.A. 1: 293.

ABYSSINIA: Harar, long. 42° 10' E., lat. 9° 20' N., 1,740 m., in evergreen scrub, corolla white, Feb., No. 5045.

*P. quinquelobatum* Hochst. ex A. Rich.—F.T.A. 1: 293.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,440 m., limestone scarp, flowers greenish, leaves rather succulent, Sept., No. 4058.

#### OXALIDACEAE.

*Oxalis corniculata* Linn.—F.T.A. 1: 296.

SOMALILAND: Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,200 m., Feb., No. 4949.

ABYSSINIA: Harar, long. 42° 6' E., lat. 9° 18' N., 1,890 m., Feb., No. 5016.

#### LYTHRACEAE.

*Lawsonia inermis* Linn.—F.T.A. 1: 143.

SOMALILAND: Jalelo, long. 44° 14' E., lat. 9° 45' N., 1,080 m., sandy stream bank, shrub 5 m., Oct., No. 4299. Vernac.—*Elan*.

*Woodfordia uniflora* (A. Rich.) Koehne in Engl. Bot. Jahrb. 1: 333 (1881).

ABYSSINIA: Harar, long. 42° 8' lat. 9° 18' N., 1,830 m., on limestone slopes, 0.3 m., flowers red, Mar., No. 5248. Vernac.—*Tulano*.

*Lythrum rotundifolium* Hochst. ex A. Rich.—F.T.A. 2: 465.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,250 m., on limestone, flowers pink, Mar., No. 5166.

*Ammannia baccifera* Linn.—F.T.A. 2: 478.

SOMALILAND: Debrawen, long. 42° 49' E., lat. 10° 20' N., 960 m., by stream, flowers greenish, Nov., No. 4671. Vernac.—*Bi-es*.

#### ONAGRACEAE.

*Epilobium hirsutum* Linn.—F.T.A. 2: 487.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,250 m., by stream, 1.5 m., flowers rose, Feb., No. 5168.

*E. stereophyllum* Fresen.—F.T.A. 2: 487. *E. fissipetalum* Steud.

ABYSSINIA: Gara mulata Mts., long. 41° 45' E., lat. 9° 15' N., 3,000 m., evergreen forest, flowers pale pink, Mar., No. 5374.

THYMELAEACEAE.

*Lasiosiphon glaucus* Fres.—F.T.A. 6, 1: 230; F.W.T.A. 1: 151.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,400 m., on limestone in remnants of evergreen forest, graceful tree 10 m. high, flowers yellow, Feb., No. 5153.

*L. somalensis* (Franch.) H.H.W.Pears.—F.T.A. 6, 1: 229.

SOMALILAND: Hargeisa, 1,290 m., on dry alluvium, flowers bright yellow, Sept., No. 4004; Liba Hele Mts., Wab wanak peak, long. 43° E., lat. 10° 20' N., 1,650 m., in Buxus-Juniperus scrub, ½ m. high, Dec., No. 4706. Vernac.—*Balle, Usar*.

var. *glabra* H.H.W.Pears.

SOMALILAND: Hargeisa, 1,350 m., on stony hills, flowers yellow, Sept., Nos. 4021, 4022.—Endemic.

NYCTAGINACEAE.

*Commicarpus plumbagineus* (Cav.) Standley in Contrib. U.S. Nat. Herb. 18: 101 (1916). *Boerhaavia plumbaginea* Cav.—F.T.A. 6, 1: 6; F.W.T.A. 1: 153.

SOMALILAND: Hargeisa, 1,290 m., flowers white, Sept., No. 3904. Vernac.—*Ged Irman*.

ABYSSINIA: N.E. of Harar, long. 42° 16' E., lat. 9° 20' N., 1,740 m., in hedgerows and evergreen scrub, climber with white flowers, Feb., No. 5040. Vernac.—*Koko bala*.

*Commicarpus verticillatus* (Poir.) Standl. var. *puberulus* Hutch. et E. A. Bruce, var. nov., a typo planta ubique puberula differt.

SOMALILAND: Hargeisa, 1,410 m., flowers bright pink, leaves whitish, Oct., No. 4247. Vernac.—*Ged Irman*.—Endemic.

*Boerhaavia diffusa* Linn. Sp. Pl. 1: 3 (1753).

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., prostrate, flowers red, fruit sticky, Sept., No. 3907. Vernac.—*Ged Irman*.

*B. elegans* Choisy—F.T.A. 6, 1: 3.

SOMALILAND: Junction of tugs, long. 44° 18' E., lat. 9° 57' N., 810 m., flowers pale, Oct., No. 4346.

ADEN: 210 m., flowers pinkish, Mar., No. 5493, 5497. Vernac.—*Ula aso* (Somali).

*B. repens* Linn.—F.T.A. 6, 1: 4.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., flowers pinkish, prostrate, Sept., No. 3969. Afard, long. 44° 8' E., lat. 10° 10' N., 540 m., flowers pale pink, minute, Oct., No. 4452. Vernac.—*Kaboh Hois, Dalagh*.

*B. viscosa* Lag. & Rodr. in Anal. Cienc. Nat. 4: 256 (1801).

SOMALILAND: Berbera, 90 m., flowers pink, Jan., No. 4763. Duwi, long. 44° 15' E., lat. 10° 5' N., 1,140 m., viscid, Oct., No. 4406. Vernac.—*Dalagh*.

# PITTOSPORACEAE.

*Pittosporum abyssinicum* Del.—F.T.A. 1: 124.

SOMALILAND: Mt. Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,740–1,770 m., on mountain top with *Juniperus*, tree to 5 m., seed orange red, Nov., No. 4589. Auboba, long. 43° E., lat. 10° 6' N., 1,770 m., on limestone slopes, with *Olea* etc., graceful tree 4 m., Nov., No. 4628.

ABYSSINIA: Geldid, long. 41° 48' E., lat. 9° 15' N., 2,400 m., in *Juniperus* forest, tree 6 m., flowers greenish yellow, Mar., No. 5389. Vernac.—*Gedad*.

*Pittosporum lanatum* Hutch. et E. A. Bruce, sp. nov. affinis *P. abyssinicae* Hochst. sed foliis vix acuminatis infra lanato-tomentosis, sepalis valde imbricatis extra tomentosis differt.

Arbor 7 m. alta; ramuli hornotini adpresse pubescentes, circiter 5 mm. crassi. *Folia* late oblanceolata, apice obtusa vel leviter obtuse acuminata, basi angustata, 6–9 cm. longa, 2–3 cm. lata, chartacea, supra intense viridia et parce pubescentia, infra molliter lanato-tomentosa; nervi laterales utrinsecus circiter 8, infra prominuli; petioli 1 cm. longi, adpresse pubescentes. *Cymae* terminales, pluriflorae, ubique adpresse pubescentes; pedicelli 3–4 mm. longi. *Sepala* valde imbricata, late ovata, 4 mm. longa, 3 mm. lata, extra tomentosa. *Petala* oblongo-oblanceolata, apice rotundata, 9 mm. longa, 3 mm. lata, basin versus trinervia, glabra. *Filamenta* 4 mm. longa; antherae 2 mm. longae. *Ovarium* ellipsoideum, tomentosum, 3 mm. longum; stylus glaber.

ABYSSINIA: Kondudo Mt., long. 42° 20' E., lat. 9° 27' N., 2,580 m., on limestone slopes, tree 7 m., flowers yellow, scented, 24 Feb., No. 5228 (type in Kew Herb.).

# FLACOURTIACEAE.

*Oncoba spinosa* Forssk.—F.T.A. 1: 115; F.W.T.A. 1: 161, fig. 67.

ABYSSINIA: Gafra valley, long. 42° 13' E., lat. 9° 21' N., 1,500 m., on granite near stream, flowers white, Feb., No. 5236. Vernac.—*Akoko*.

*Flacourtia hirtiuscula* Oliv. forma glabra.—F.T.A. 1: 121.

ABYSSINIA: Gafra valley, on granite near stream, tree 6 m., No. 5239.

*Dovyalis abyssinica* (Clos.) Warb. in Engl. Pflanzenfam. 3, 6A: 44 (1893). *Aberia abyssinica* Clos.—F.T.A. 1: 121.

ABYSSINIA: Mulkajibri, long. 42° 16' E., lat. 9° 24' N., 1,800–2,340 m., on granite, bushy tree 5 m., flowers green, Feb., No. 5092. Vernac.—*Koshum*.

*D. verrucosa* Warb. l.c. *Aberia verrucosa* Hochst.—F.T.A. 1: 121.

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 25' N., 2,190 m., limestone slopes, in undergrowth, 2 m. high, Mar., No. 5448.—Endemic.

# TAMARICACEAE.

*Tamarix nilotica* Ehrenb. in Linnaea 2 : 269 (1827).

SOMALILAND : near Eil Demet, long. 44° 17' E., lat. 9° 53' N., up to 980 m., sandy banks of stream, shrub 5 m., flowers white, Oct., No. 4302. Vernac.—*Dor*.

# PASSIFLORACEAE.

*Adenia aculeata* (Oliv.) Engl. Bot. Jahrb. 14 : 375 (1892).

SOMALILAND : Buramo, long. 43° 12' E., lat. 10° 1' N., 1,170 m., climber, 29 Jan., No. 4888. Vernac.—*Lamagoia*.—Endemic.

*A. venenata* Forssk. Fl. Aegypt.-Arab. 77 (1775).

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., large swollen stem, fruit green and red, Oct., No. 4193. Duwi Pass, long. 44° 15' E., lat. 10° 5' N., 1,050 m., among rocks, flowers cream and red, Oct., No. 4370. Weranwis valley, long. 43° 50' E., lat. 10° 15' N., 480 m., open scrub, stem succulent, Nov., No. 4528. Vernac.—*Adahi medu*.

*Adenia vitifolia* Hutch. et E. A. Bruce, sp. nov., affinis *A. Ellenbeckii* Harms, sed foliis crispato-pubescentibus marginibus loborum vix dentatis neque punctatis differt.

Herba basi lignosa 0.3 m. alta, erecta vel scandens ; caules molliter pubescentes, costati. *Folia* digitatim partita, crispato-pubescentia, segmentis oblanceolatis marginibus undulatis usque ad 4 cm. longis nervis lateralibus infra prominentibus ; petioli 2–3 cm. longi, apice biglandulosi, pubescentes. *Cirrhi* simplices, subrecti, glabri, 3.5 cm. longi. *Flores* ♂ pauci, axillares, cremei ; pedicelli 5 mm. longi, apice articulati ; calycis tubus longe cylindricus, 2 cm. longus, crebre et minute purpureo-maculatus ; lobi 5, oblongi, apice rotundati, 5 mm. longi, intra lanati ; petala spatulato-oblonga, 3 mm. longa ; antherae 6 mm. longae, mucronatae ; ovarii rudimentum subulatum. *Flores* ♀ non visi. *Fructus* late ellipsoideus, circiter 5 cm. longus, glaber. *Semina* compressa, ellipsoidea, 8 mm. longa, verrucosa.

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N. 990 m., 0.3 m. high, erect or climbing, slightly poisonous, flowers, cream, 6 Oct., No. 4202 (type in Kew Herb.). Vernac.—*Dalan Ka Wareri*.

# CUCURBITACEAE.

*Melothria tomentosa* Cogn. in DC. Monogr. Phan. 3 : 614 (1881).

ABYSSINIA : Fuyan Hunjuba, long. 42° 17' E., lat. 9° 26' N., 1,920 m., on granite, flowers cream, Feb., No. 5101.

*Momordica dissecta* Baker in Kew Bull. 1895 : 215.

SOMALILAND : Dobo Pass, long. 43° 15' E., lat. 10° 16' N., 960 m., on gneiss alluvium, flowers yellow, Feb., No. 4977. Vernac.—*Dombaiyod*.—Endemic.

*M. Schimperiana* Naud. in Ann. Sci. Nat. Ser. 5, 5 : 23 (1866).

ABYSSINIA : Kondudo Mt., long. 42° 18' E., lat. 9° 27' N., 2,100 m., on limestone, flowers white, ripe fruit yellow, Feb., No. 5106. Vernac.—*Sara*.

*Cucumis dipsaceus* Ehrenb.—F.T.A. 2: 543; F.W.T.A. 1: 182.  
SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., flowers yellow, Sept., No. 3942. Vernac.—*Gombol*.

*C. ficifolius* A. Rich.—F.W.T.A. 1: 182.

SOMALILAND: Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., flowers yellow, Oct., No. 4134.

Var. *echinophorus* Naud. in Ann. Sci. Nat. Ser. 4, 11: 16 (1859).

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., flowers yellow, Sept., No. 3967.

*C. prophetarum* Linn.—F.T.A. 2: 545; F.W.T.A. 1: 182.

SOMALILAND: Debrawen, long. 42° 49' E., lat. 10° 26' N., 1,930 m., on stony plain, flowers yellow, Nov., No. 4651.

*Citrullus vulgaris* Schrad.—F.T.A. 2: 549; F.W.T.A. 1: 183.

SOMALILAND: Berbera, Mar., No. 4759. Vernac.—*Unun*.  
The Water Melon.

*Coccinia cordifolia* Cogn.—F.W.T.A. 1: 184, fig. 81.

SOMALILAND: Dobo Pass, long. 43° 15' E., lat. 10° 16' N., 960 m., on gneiss alluvium, climber, flowers yellow with greenish veins, Feb., No. 4976. Vernac.—*Ra ha ro ho*.

*C. palmatisecta* Kotschy in Sitzb. Head. Wien. Math.-Nat. 51: 360, t. 4 (1865).

SOMALILAND: Auboba, long. 43° E., lat. 10° 6' N., 1,740 m., on alluvial soil, prostrate, flowers yellow, green veined, Nov., No. 4622. Vernac.—*Sar Gudun*.—Also in Eastern Sudan.

*Coccinia quercifolia* Hutch. et E. A. Bruce, sp. nov. affinis *C. sessilifoliae* (Sond.) Cogn., sed foliis pinnatipartitis lobulis apice rotundatis et mucronatis differt.

Caules graciles, e basi lignosa flavida orti, glabri, internodiis circiter 3 cm. longis; cirrhi simplices, graciles, circiter 4 cm. longi. Folia sessilia, subamplexicaulia, pinnatipartita, usque ad 8 cm. longa, lobis lateralibus utrinque circiter 3-lobatis mucronatis, basalibus longioribus 3 cm. longis, glauco-viridia, demum laxe verrucoso-punctata. Flores ♂ axillares 1-3, flavi; pedicelli graciles, usque ad 1.5 cm. longi; hypanthium late turbinatum, striatum, 6 mm. longum; calycis dentes minimi, subulati; corolla extra pubescens, tubo 6 mm. longo campanulato, lobis ovatis acutis nervosis circiter 9 mm. longis; antherae 1.5 mm. longae; filamenta 3 mm. longa, basi corollae inserta. Flores ♀ solitarii; pedicelli crassi, 8 mm. longi; hypanthium 2 cm. longum, cylindricum; corolla breviter infundibuliformis, nervosa, lobis late ovatis circiter 7 mm. longis.

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., leaves bluish, flowers yellow, 6 Oct., No. 4194 (type in Kew Herb.). Harradigit, Apr., *James and Thrupp*.

*Raphanocarpus Stefaninii* Chiov. Fl. Somalia 1: 179, t. XX, fig. 2A (1929).

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., flowers yellow, large woody rootstock, Oct., No. 4199. Vernac.—*Gusungus*.—Endemic.

## OCHNACEAE.

*Ochna inermis* (Forssk.) Schweinf. in Engl. Bot. Jahrb. 33 : 247 (1903).

SOMALILAND : near Eil Demet, long.  $44^{\circ} 17' E.$ , lat.  $9^{\circ} 53' N.$ , 930 m., lava slopes among Acacias, shrub 2 m., fr. perianth orange, Oct., No. 4305. Jifa Uri, long.  $43^{\circ} 22' E.$ , lat.  $9^{\circ} 42' N.$ , on gneiss kopje, in evergreen scrub, shrub 2 m., Jan., No. 4833.

ABYSSINIA : Gobelli, long.  $41^{\circ} 59' E.$ , lat.  $9^{\circ} 10' N.$ , 1,530 m., on granite, bush 2 m., Mar., No. 5264. Vernac.—*Oloigi* (Somali.) ; *Ergatanenja* (Abyss.).—Also in Eritrea and Arabia.

## MYRTACEAE.

*Syzygium guineense* DC.—F.W.T.A. 1 : 201.

ABYSSINIA : Gapa valley, long.  $42^{\circ} 13' E.$ , lat.  $9^{\circ} 21' N.$ , 1,500 m., on granite rocks by stream, tree 5 m. high, Feb., No. 5241.

## COMBRETACEAE.

*Combretum aculeatum* Vent.—F.T.A. 2 : 423 ; F.W.T.A. 1 : 220.

SOMALILAND : Weranwis valley, long.  $43^{\circ} 50' E.$ , lat.  $10^{\circ} 15' N.$ , 480 m., shrub 3 m., calyx red, corolla cream, Nov., No. 4530. Elmis, long.  $44^{\circ} 14' E.$ , lat.  $10^{\circ} 20' N.$ , 230 m., climber on sandy plain, Oct., No. 4496. Vernac.—*Iswud*, *Shuna shuna*.

*C. collinum* Fres.—F.T.A. 2 : 427 ; F.W.T.A. 1 : 220.

ABYSSINIA : Gafra valley, long.  $42^{\circ} 13' E.$ , lat.  $9^{\circ} 21' N.$ , 1,500 m., on granite in open woodland, tree 4 m., flowers cream, Feb., No. 5246.

*C. ferrugineum* A. Rich. Fl. Abyss. 1 : 267 (1847).

SOMALILAND : Auboba, long.  $43^{\circ} E.$ , lat.  $10^{\circ} 6' N.$ , 1,650–1,800 m., on limestone slopes, tree 7 m., Nov., No. 4623. Vernac.—*Obol*.—Also in Abyssinia.

*C. molle* R. Br. ex. G. Don in Trans. Linn. Soc. 15 : 431 (1827).

*C. trichanthum* Fres.—F.T.A. 2 : 431.

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , on rocky limestone, flowers greenish cream, Sept., No. 4051. Biyu Suldan, long.  $43^{\circ} E.$ , lat.  $10^{\circ} 20' N.$ , 1,200 m., tree 8 m., Dec., No. 4702. Vernac.—*Obol*.

*Terminalia Brownei* Fres.—F.T.A. 2 : 415 ; F.W.T.A. 1 : 224.

SOMALILAND : Duwi, long.  $44^{\circ} 15' E.$ , lat.  $10^{\circ} 5' N.$ , 900–1,050 m., in tree-Acacia grass community, tree 5 m., Oct., No. 4424.

ABYSSINIA : Gafra valley, long.  $42^{\circ} 13' E.$ , lat.  $9^{\circ} 21' N.$ , 1,530 m., in upper deciduous scrub, tree 10 m., Feb., No. 5072. Vernac.—*Wob* (Somali.) ; *Alulo* (Abyss.).

*T. orbicularis* Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. 4 : 26, t. xv a (1899).

SOMALILAND : near Bohotle, long.  $46^{\circ} 20' E.$ , lat.  $8^{\circ} 15' N.$  in *Commiphora* bush-Acacia formation, small tree, fruits bright pink, Dec., No. 4718. Vernac.—*Bisag*.—Also in Tanganyika.

*T. spinosa* Engl. Pflanzenw. Ost. Afr. C : 294 (1895).

SOMALILAND : near Eil Demet, long.  $44^{\circ} 17' E.$ , lat.  $9^{\circ} 53' N.$ , 990 m., edge of lava plateau, tree 5 m., fruit reddish, Oct., No. 4321. Ali Wein Mt., long.  $45^{\circ} 15' E.$ , lat.  $10^{\circ} 24' N.$ , 540 m., in limestone ravine, tree 4 m., Jan., No. 4828. Vernac.—*Hareri*.

#### RHIZOPHORACEAE.

*Cassipourea abyssinica* Alston in Kew Bull. 1925 : 253.

ABYSSINIA : Galla Pass, long.  $42^{\circ} 19' E.$ , lat.  $9^{\circ} 28' N.$ , 2,400 m., in low forest on limestone slope, 4 m., flowers green, Feb., No. 5148.—Also in Eritrea and Somaliland.

#### HYPERICACEAE.

*Hypericum lanceolatum* Lam.—F.T.A. 1 : 156 ; F.W.T.A. 1 : 230, fig. 99.

ABYSSINIA : Galla Pass, long.  $42^{\circ} 19' E.$ , lat.  $9^{\circ} 28' N.$ , 2,400 m., rank herbage up to *Podocarpus* forest, 3 m., flowers yellow, Feb., No. 5142. Vernac.—*Mito*.

*H. peplidifolium* A. Rich.—F.T.A. 1 : 155.

ABYSSINIA : Galla Pass, long.  $42^{\circ} 19' E.$ , lat.  $9^{\circ} 28' N.$ , 2,250 m., near irrigation in *Podocarpus* forest, prostrate, flowers yellow, Feb., No. 5116. Kondudo Mt., long.  $42^{\circ} 20' E.$ , lat.  $9^{\circ} 27' N.$ , 2,790 m., marshy hollows on limestone, Feb., No. 5218.

*H. Quartinianum* A. Rich.—F.T.A. 1 : 156.

ABYSSINIA : Kondudo Mt., long.  $42^{\circ} 18' E.$ , lat.  $9^{\circ} 27' N.$ , 2,100 m., in Juniper forest, 2 m., yellow, Feb., No. 5105. Vernac.—*Riga ganze*.

#### TILIACEAE.

*Corchorus cinerascens* Defflers in Bull. Soc. Bot. Fr. 42 : 300 (1895).

SOMALILAND : Afard, long.  $44^{\circ} 8' E.$ , lat.  $10^{\circ} 10' N.$ , 510 m., on sand, small shrub, 0.5 m., fls. yellow, Oct., No. 4439. Dubriat Mt., long.  $45^{\circ} 10' E.$ , lat.  $10^{\circ} 22' N.$ , 150 m., on shingly plain, 30 cm., Jan., No. 4779. Vernac.—*Adar*.—Also in Arabia.

*C. depressus* (Linn.) Stocks in Proc. Linn. Soc. 1 : 367 (1848). *C. Antichorus* *Raesch.*—F.T.A. 1 : 263 ; F.W.T.A. 1 : 241.

SOMALILAND : Dubriat Mt., long.  $45^{\circ} 10' E.$ , lat.  $10^{\circ} 22' N.$ , 150 m., on open sand, prostrate, flowers yellow, Jan., No. 4777.

*C. trilocularis* Linn.—F.T.A. 1 : 262 ; F.W.T.A. 1 : 241.

SOMALILAND : Afard, long.  $44^{\circ} 8' E.$ , lat.  $10^{\circ} 10' N.$ , 570 m., in open scrub, fls. yellow, Oct., No. 4450. Las Dawan, long.  $45^{\circ} 12' E.$ , lat.  $10^{\circ} 20' N.$ , 180 m., Jan., No. 4811.

*Grewia canescens* A. Rich. Tent. Fl. Abyss. 1 : 86 (1847).

SOMALILAND : Hargeisa, long.  $44^{\circ} E.$ , lat.  $9^{\circ} 35' N.$ , 1,350 m., 3 m., fls. yellow, Oct., No. 4249. Near Eil Demet, long.  $44^{\circ} 17' E.$ , lat.  $9^{\circ} 53' N.$ , 960 m., on lava slopes, shrub 2 m., berries edible, Oct., No. 4320.

ABYSSINIA : south west of Harar, long.  $42^{\circ} 6' E.$ , lat.  $9^{\circ} 17' N.$ , 1,800 m., lower evergreen formation, shrub 3 m., Jan., No. 5253. Vernac.—*Aroresa* (Abyss.) ; *Debbih medu* (Somal.).



*G. erythraea* Schweinf. in Verh. Zool.-Bot. Ges. Wien 18: 671 (1868).

SOMALILAND: boundary, long.  $44^{\circ} 10' E.$ , lat.  $8^{\circ} 57' N.$ , 1,260 m., woody plant, fls. white, Sept., No. 4087; 4136; boundary pillar 93, long.  $45^{\circ} 9' E.$ , lat.  $8^{\circ} 37' N.$ , 990 m., fls. white, Oct., No. 4175; 4176; 4177. Vernac.—*Medo Ainyo*; *Tukal Lalms*; *Karfade*.

*G. fallax* K. Schum. in Engl. Bot. Jahrb. 15: 116 (1893).

SOMALILAND: Kabal gabat Pass, long.  $43^{\circ} E.$ , lat.  $10^{\circ} 20' N.$ , 1,110 m., gneiss rocks in open wood, 3 m., fls. yellow, Dec., No. 4680. Buramo-Warieto, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} 2' N.$ , up to 1,260 m., near stream beds, shrub 4 m., fls. yellow, Feb., No. 4917. Vernac.—*Debi fita widir*.

*G. ferruginea* Hochst. ex A. Rich.—F.T.A. 1: 251.

ABYSSINIA: Ridge S.W. of Harar, long.  $42^{\circ} 6' E.$ , lat.  $9^{\circ} 17' N.$ , 1,890 m., on granite in lower evergreen formation, shrub 3 m., fls. white, Mar., No. 5251. Vernac.—*Bururi*.—Also in Eritrea.

*G. mollis* Juss.—F.T.A. 1: 248; F.W.T.A. 1: 244.

SOMALILAND: Hargeisa, long.  $42^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., among *Aloe* in tree-Acacia formation, bush 1 m., fls. yellow, 21 Sept., No. 3940. Vernac.—*Debi ad*.

The wood is white and is used for spears, walking sticks, and props for milk vessels.

*G. Schweinfurthii* Burret in Engl. Bot. Jahrb. 45: 173 (1910).

SOMALILAND: Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 34' N.$ , 1,290 m., on stony sandstone slopes, shrub 1.5 m., fls. yellow, Sept., No. 3998. Vernac.—*Debbih medu*.—Also in Arabia.

*G. tembensis* Fresen. Mus. Senckenb. 2: 158 (1837).

SOMALILAND: Duwi Pass, long.  $44^{\circ} 15' E.$ , lat.  $10^{\circ} 5' N.$ , 1,200 m., in *Buxus-Acokanthera* scrub, shrub 4 m., fls. pale purple and white, Oct., No. 4375. Rarele Mt., nr. Buramo, long.  $43^{\circ} 15' E.$ , lat.  $10^{\circ} N.$ , 1,800 m., on gneiss slope, shrub 2 m., fls. white, Dec., No. 4726.

ABYSSINIA: Gobelli, long.  $41^{\circ} 59' E.$ , lat.  $9^{\circ} 10' N.$ , 1,590 m., on granite, shrub 2 m., Mar., No. 5300. Vernac.—*Ture* (Somali).

*G. tenax* (Forssk.) Fiori in Agricoltura Coloniale 5: Suppl. 23, fig. 114B (1911). *G. populifolia* Vahl—F.T.A. 1: 246; Burret in Engl. Bot. Jahrb. 45: 192.

SOMALILAND: Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., fls. white, 1 m., Sept., No. 4044. Vernac.—*Duferu*.

Fls. and frt. eaten, ripe fruit called *Arsum*, fls. *Obah*, roots are used to make a poultice.

*G. villosa* Willd.—F.T.A. 1: 249, F.W.T.A. 1: 244, fig. 107.

SOMALILAND: Hargeisa, long.  $44^{\circ} 3' E.$ , lat.  $9^{\circ} 33' N.$ , 1,260 m., shrub 2 m., Sept., No. 4200. Boundary Pillar 93, No. 4215A. Vernac.—*Gomesha*.

A good feed for stock; fruit eaten by Somalis.

*Sparrmania ricinocarpa* (Eckl. & Zeyh.) O. Ktze. Rev. Gen. 3, 2: 26 (1893).

ABYSSINIA: Kondudo Mt., long.  $42^{\circ} 20' E.$ , lat.  $9^{\circ} 27' N.$ , 2,520 m., on limestone slopes, 2 m., fls. pink, Feb., No. 5209.

*Triumfetta actinocarpa* S. Moore in Journ. Bot. 15: 66 (1877).

SOMALILAND: Daradoanleh tug, long. 44° 16' E., lat. 10° N., 1,080 m., in denuded tree-Acacia grass community, small shrub 0.2 m., fls. yellow, Oct., No. 4355.—Endemic.

*T. flavescens* Hochst. ex A. Rich.—F.T.A. 1: 255.

SOMALILAND: about long. 44° 15' E., lat. 10° 5' N., 1,050–1,200 m., No. 4397A. Barataga, long. 44° 1' E., lat. 10° 5' N., 990 m., in tree-Acacia community, 1 m., fls. yellow, Oct., No. 4524. Vernac.—*Salo weni*.

*T. heterocarpa* var. *glabrior* Sprague & Hutch. in Journ. Linn. Soc. Bot. 39: 265 (1909).

SOMALILAND: Buramo, long. 43° 10' E., lat. 10° N., 1,500 m., in Acacia open wood, small shrub, 30 cm., fls. yellow, Jan., No. 4859. Vernac.—*Salo weni*.—Endemic.

*T. trigona* Sprague & Hutch. in Journ. Linn. Soc. Bot. 39: 263 (1909).

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,050–1,200 m., on fringes of *Buxus* scrub, small shrub 1 m., fls. yellow, Oct., No. 4397. *Jebel Wolni* Mt., long. 45° 6' E., lat. 10° 18' N., on limestone, in open scrub, 0.5 m., fls. yellow, Jan., No. 4797. Vernac.—*Salo weni*.—Endemic.

#### STERCULIACEAE.

*Dombeya Bruceana* A. Rich.—F.T.A. 1: 229; K. Schum. in Engl. Pflanzenfam. Sterculiaceae, 22.

ABYSSINIA: Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,550–2,820 m., evergreen forest, limestone slopes, tree to 10 m., with white flowers, Mar., No. 5309.

*Melhanianella Kellera* Schinz in Bull. Herb. Bois. Ser. II: 1008 (1902).

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., on heavily grazed ground, flowers pale yellow, Oct., No. 4209.—Endemic.

*M. Denhamii* R.Br.—F.T.A. 1: 234; F.W.T.A. 1: 248; Chiov. Fl. Somal. 103; Engl. Monogr. Pflanzenfam. Sterculiaceae, 15.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., on dry alluvium, flowers yellow, Sept., No. 4003.

Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,140 m., in open wood on gneiss hills, involucre bracts reddish, Feb., No. 4974.

*M. Phillipsiae* Bak. f. in Journ. Bot. 1898: 4.

SOMALILAND: Buramo, Warieto tug, long. 43° 10' E., 1,080 m., lat. 10° 2' N., on gneiss hills and in Acacia open wood, flowers yellow, Jan., No. 4908.—Endemic.

*M. muricata* Balf. f. in Proc. Roy. Soc. Edinb. 11: 503 (1882).

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., fls. pale yellow, Oct., No. 4213. Vernac.—*Burbur* (crumbs).—Also in Socotra.

*M. rotundata* Hochst.—F.T.A. 1: 230; K. Schum. in Engl. l.c. 4.  
SOMALILAND: Mt. Wobleh, long. 43° 17' E., lat. 10° 15' N., 990 m., gneiss slopes and Acacia open wood, ½ m. high with yellow flowers, Feb., No. 4992.—Also in Abyssinia.

*Hermannia boranensis* K. Schum. in Engl. Bot. Jahrb. 33: 311 (1903).

SOMALILAND: Afard, long. 44° 8' E., lat. 10° 10' N., 600 m., on schist slopes in open scrub, small shrub 1 m., fls. yellow, Oct., No. 4447. Vernac.—*Salo weni*.—Endemic.

*Waltheria indica* Linn. *W. americana* Linn.—F.T.A. 1: 235; F.W.T.A. 1: 250; K. Schum. in Engl. l.c. 45; Chiov. Fl. Somal. 105.

SOMALILAND: Barataga, long. 44° 1' E., lat. 10° 5' N., 480 m., flowers yellow, Oct., No. 4527.

ABYSSINIA: Gafra Valley, long. 42° 13' E., lat. 9° 21' N., 1,500 m., in deciduous scrub formation on granite slopes, Feb., No. 5067.

*Sterculia arabica* (R.Br.) T. Anders. ex Blatter Fl. Aden, 127 (1915).

ADEN: 150–450 m., in sub-desert on lava crags, small tree 4 m., stem with purple blotches, fls. yellow, 21 March, No. 5476.—Also in Socotra.

*S. Rivae* Chiov. Fl. Somal. 103 (1929). *S. Triplaca* var. *Rivaei* K. Schum. in Engl. l.c. 106.

SOMALILAND: Buramo, Warieto tug, long. 43° 10' E., lat. 10° 2' N., 1,050–1,200 m., in Acacia open woodland and on steep gneiss slopes, tree 6 or 7 m., bark white with purple blotches, perianth crimson at base and green at apex in bud, later yellowish-green, young fruit crimson, Jan., No. 4900; Hargeisa, long. 44° E., lat. 9° 35' N., 1,380 m., on sandstone rocks, wood soft, bark papery, fruit eaten by Somalis, Jan., No. 4260. Vernac.—*Garaho*.

#### MALVACEAE.

*Abutilon angulatum* Mast.—F.T.A. 1: 183; F.W.T.A. 1: 261.

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 27' N., 1,980 m., on limestone in cleared Juniper forest, shrub 1.5 m. high, fls. white with purple centre, Mar., No. 5460.

*A. bidentatum* Hochst.—F.T.A. 1: 186.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., level ground in Tree Acacia formation, woody herb ½ m. high, flowers yellow, Sept., No. 3923. Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., Oct., No. 4131. Buramo, long. 43° 10' E., lat. 10° 2' N., 1,200 m., Feb., No. 4916. Dobo Pass, long. 43° 15' E., lat. 10° 16' N., 960 m., on alluvial gneiss in Acacia open wood, flowers golden yellow, Feb., No. 4975. Vernac.—*Balumbal*.

*A. fruticosum* Guill. & Perr.—F.T.A. 1: 187; F.W.T.A. 1: 261.

SOMALILAND: Boundary at long. 44° 10' E., lat. 8° 57' N., 1,260 m., moist places, fls. yellow, 29 Sept., No. 4089. Duwi, long. 44° 15' E., lat. 10° 5' N., 840–990 m., Oct., No. 4387. Near Buramo, long. 43° 10' E., lat. 10° N., 1,500 m., Nov., No. 4602; No. 4907. Vernac.—*Wana-ad*.

*A. molle* Baker in Kew Bull. 1895 : 212.

SOMALILAND : Boundary Pillar, long. 45° 9' E., lat. 8° 37' N., 990 m., in shade of bush,  $\frac{1}{2}$  m. high, flowers yellow with a crimson eye, Oct., No. 4161.—Vernac.—*Balumbal*.—Endemic.

*A. ramosum* Guill. and Perr.—F.T.A. 1 : 186 ; F.W.T.A. 1 : 261.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., level ground in tree Acacia formation, 1 m. high, flowers yellow, Sept., No. 3922.—Vernac.—*Balumbal*.

*Sida ovata* Forssk. Fl. Arab. 124, No. 84 (1775). *Sida grewoides* Guill. and Perr.—F.T.A. 1 : 182. F.W.T.A. 1 : 263.

SOMALILAND : Boundary, long. 44° 10' E., lat. 8° 57' N., 1,260 m., in *Acacia Bussei* association, flowers yellow, Sept., No. 4090.

*S. rhombifolia* Linn.—F.T.A. 1 : 181 ; F.W.T.A. 1 : 263.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., on level ground in tree Acacia formation, flowers yellow, Sept., No. 3925.

*S. Schimperiana* Hochst.—F.T.A. 1 : 180.

ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,920 m., limestone to open grass in evergreen scrub formation, flowers yellow, 17 Feb., No. 5024.

*S. triloba* Cav.—F.T.A. 1 : 179.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,400 m., on close-grazed grass beneath trees, flowers and fruit white, Feb., No. 5163.

*Pavonia arabica* Hochst.—F.T.A. 1 : 193.

SOMALILAND : near Aleyalale, long. 44° 16' E., lat. 10° N., 1,080 m., among stones on lava plateau, dwarf, fls. pink, Oct., No. 4357. Buramo, Warieto, long. 43° 10' E., lat. 10° 2' N., 1,080 m., on gneiss hills, Jan., No. 4909.

*P. Burchellii* (DC.) R. A. Dyer in Kew Bull. 1932 : 152.

SOMALILAND : Debrawen, long. 43° 10' E., lat. 10° 5' N., 990 m., on limestone alluvium in Acacia thicket, shrub 0.5 m., fls. yellow, Feb., No. 4941. Boundary, long. 44° 10' E., lat. 8° 57' N., Feb., No. 4112. Vernac.—*Balumbal*, *Salo-weni*.

ABYSSINIA : Haramaia, long. 42° E., lat. 9° 24' N., 1,980 m., in hedges, fls. yellow, Mar., No. 5472.

*P. Hildebrandtii* Gürke in Engl. Bot. Jahrb. 48 : 371 (1912).

SOMALILAND : Buramo, long. 43° 10' E., lat. 10° N., 1,500 m., on gneiss slopes, in open Acacia wood, fls. cream, turning pink, Jan., No. 4861.—Endemic.

*P. Kotschyi* Hochst.—F.T.A. 1 : 192 ; F.W.T.A. 1 : 264.

SOMALILAND : Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,140 m., open wood on gneiss slopes, fls. lemon yellow, Feb., No. 4973.

*P. Schimperiana* Hochst. var. *tomentosa* Ulbr. in Engl. Bot. Jahrb. 57: 109 (1920).

ABYSSINIA: Harar, long.  $42^{\circ} 10'$  E., lat.  $9^{\circ} 20'$  N., 1,740 m., near stream in grass among evergreen scrub, fls. pink, Feb., No. 5034. Yuka, long.  $41^{\circ} 40'$  E., lat.  $9^{\circ} 25'$  N., 2,310 m., on limestone near stream in open Podocarpus forest, 2 m. high, Mar., No. 5443. Vernac.—*Abblalati*.

*P. Sennii* Chiov. Fl. Somalia 2: 23, fig. 8 (1932).

SOMALILAND: Elmis, long.  $44^{\circ} 14'$  E., lat.  $10^{\circ} 20'$  N., 230 m., on sandy plains in desert-grass formation, suffruticose with white flowers, Oct., No. 4487.—Endemic.

*P. zeylanica* (L.) Cav.—F.T.A. 1: 192; F.W.T.A. 1: 263.

SOMALILAND: Boundary Pillar 93, long.  $45^{\circ} 9'$  E., lat.  $8^{\circ} 37'$  N., 990 m., fls. pale yellow, Oct., No. 4186. Buramo, Dumuk tug, long.  $43^{\circ} 12'$  E., lat.  $10^{\circ} 1'$  N., 1,200 m., on sandy bank, viscid, Jan., No. 4893.

*Cienfuegosia Ellenbeckii* Gürke in Engl. Bot. Jahrb. 33: 381 (1903).

SOMALILAND: Biji, long.  $44^{\circ} 5'$  E., lat.  $10^{\circ} 12'$  N., 540 m., at top of schist mountain in open Commiphora scrub, a slender shrub to 1 m., flowers yellowish red, Oct., No. 4507.

*C. Welshii* (T. Ands.) Garcke in Eichl. Jahrb. Bot. Gart. Berl. 2: 337 (1883).

SOMALILAND: Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,290 m., on sandy ground by dry stream bed, flowers yellow, aromatic, Oct., No. 4239; 1,350 m., flat spot on hills north of Hargeisa, Sept., No. 4030.—Also in Arabia.

*Hibiscus asper* Hk. f. Niger Fl. 228; F.W.T.A. 1: 268.

SOMALILAND: Jihu hills, long.  $43^{\circ} 15'$  E., lat.  $10^{\circ}$  N., 1,200 m., small shrub, 2 m. high, flowers yellow, Nov., No. 4601. Vernac.—*Edi libah*.

*H. calycinus* Willd.—F.T.A. 1: 202.

SOMALILAND: Hargeisa, long.  $44^{\circ} 3'$  E., lat.  $9^{\circ} 33'$  N., 1,260 m., in shade of Acacias near the river, flowers yellow with dark crimson centre, Sept., No. 4069. Vernac.—*Salo weni*.

*H. crassinervius* Hochst.—F.T.A. 1: 205.

ABYSSINIA: Yuka, long.  $41^{\circ} 40'$  E., lat.  $9^{\circ} 27'$  N., 1,980 m., on limestone slopes in open evergreen scrub, small shrub 2 m. high, flowers scarlet, Mar., No. 5450.

*H. Hildebrandtii* Sprague & Hutch. in Kew Bull. 1907: 46.

SOMALILAND: Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,290 m., level ground among aloes in Tree Acacia formation, 1 m. high, flowers scarlet, berries edible, Sept., No. 3936. Vernac.—*Mira-gel-jira*.

*H. Ludwigii* Eckl. & Zeyh.—F.T.A. 1: 203.

ABYSSINIA: Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,580 m., on limestone slopes in Juniper-Podocarpus forest, woody herb 3 m., flowers yellow with dark red mark at base of petal, Mar., No. 5340.

*H. lunariifolius* Willd.—F.T.A. 1: 202; F.W.T.A. 1: 268.  
*Hibiscus dongolensis* Del.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,050 m., among rocks in tree-acacias-grass community, flowers yellow with dark crimson centre, Oct., No. 4366. Vernac.—*Mira gel jira*.

*H. micranthus* Linn.—F.T.A. 1: 205.

SOMALILAND: Duwi, long. 44° 12' E., lat. 10° 8' N., 690 m., flowers pink, Oct., No. 4442. Vernac.—*Mira gel jira*.

*H. somalensis* Franch. in Révoil Pays Somalis 16 (1882).

SOMALILAND: Boundary, long. 44° 10' E., lat. 8° 5' N., 1,260 m., in moister places, flowers scarlet, Sept., No. 4086. Vernac.—*Mira gel jira*.

*H. spartioides* Chiov. Fl. Somala 99, tab. 3: 2 (1929).

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., flowers scarlet, Oct., No. 4205. Vernac.—*Ged medu*.—Endemic.

*H. vitifolius* Linn.—F.T.A. 1: 197.

ABYSSINIA: Haramaia, long. 42° E., lat. 9° 24' N., 1,980 m., erect to 2 m., flowers lemon yellow, Mar., No. 5473.

*Lavatera abyssinica* Hutch. et E. A. Bruce, sp. nov. affinis *L. unguiculatae* Desf., sed floribus axillaribus fasciculatis, epicalyce profunde lobato differt.

Suffrutex ad 2 m. altus, ubique stellato-tomentellus; internodia circiter 4 cm. longa. *Folia* ambitu pentagona, 5-lobata, circiter 4 cm. longa et lata, basi cordata, lobis anguste ovatis, irregulariter dentata, nervis infra prominentibus; petioli 3–4 cm. longi; stipulae oblique ovatae, 1 cm. longae, striato-nervosae. *Flores* rosei, carmineo-lineati, axillares, fasciculati vel rare subsolitarii; pedicelli ad 2 cm. longi. *Epicalycis lobi* 3, ovati, subacuti, 5 mm. longi. *Calyx* late campanulatus, ad medium 5-lobatus, 1 cm. longus, lobis ovato-triangularibus acuminatis. *Petala* pallide rosea, purpureo-lineata, obovata, 2 cm. longa, 1 cm. lata, unguiculata, unguibus dense ciliatis. *Columna staminalis* 1 cm. longa, infra antheras leviter pubescens. *Styli* purpurascens, 4 mm. exserti. *Carpella* fructu circiter 15, glabra.

ABYSSINIA: Slopes of Mt. Sarerta, long. 42° 19' E., lat. 9° 20' N., 2,400 m., rank herbaceous scrub to Podocarpus forest, plant 2 m. high, with pale pink flowers, 23 Feb., No. 5195 (type in Kew Herb.). Vernac.—*Liti ada* (Galla).

The first record of this genus for Tropical Africa.

*Malva parviflora* Linn.—F.T.A. 1: 177.

SOMALILAND: Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,200 m., on gneiss hills and in Acacia open wood, petals white below, pink in the upper part, Feb., No. 4970.

#### MALPIGHIACEAE.

*Caucanthus edulis* Forssk. Fl. Aegypt.-Arab. 91, n. 78 (1775).

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., in Commiphora-Acacia open scrub, flowers white, shrub 1 m., Oct., No. 4150. Vernac.—*Marmarod*.—Also in Arabia.

EUPHORBIACEAE.

*Phyllanthus Hildebrandtii* Pax.—F.T.A. 6, 1: 707.

SOMALILAND: Dobo Pass, long.  $43^{\circ} 15'$  E., lat.  $10^{\circ} 15'$  N., 1,200 m., in open Acacia wood and crannies of gneiss rocks, flowers greenish-cream, Feb., No. 4957.—Endemic.

*P. maderaspatensis* Linn.—F.T.A. 6, 1: 722; F.W.T.A. 1: 291.

SOMALILAND: Hargeisa, 1,440 m., on top of rocky hill (limestone), flowers greenish, Sept., No. 4025.

*P. meruensis* Pax—F.T.A. 6, 1: 704.

ABYSSINIA: Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,700 m., in evergreen forest, stems red, March, No. 5300.

*P. Niruri* Linn.—F.T.A. 6, 1: 731; F.W.T.A. 1: 291.

SOMALILAND: Las Dawan, long.  $45^{\circ} 12'$  E., lat.  $10^{\circ} 20'$  N., 180 m., in sandy bed of small tug, flowers greenish, Jan., No. 4812.

*P. pentandrus* Schum. & Thonn.—F.T.A. 6, 1: 710; F.W.T.A. 1: 291.

SOMALILAND: Hargeisa, 1,440 m., on limestone escarpment, flowers greenish, Sept., No. 4060; Boundary, long.  $44^{\circ} 10'$  E., lat.  $8^{\circ} 57'$  N., 1,290 m., Oct., No. 4118; Dubriat Mt., long.  $45^{\circ} 10'$  E., lat.  $10^{\circ} 22'$  N., 210 m., Jan., No. 4792; Buramo-Warieto tug, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ} 2'$  N., 1,080 m., on gneiss hills in Acacia open wood, flowers reddish, Jan., No. 4912.

*P. reticulatus* Poir.—F.T.A. 6, 1: 700; F.W.T.A. 1: 290.

ABYSSINIA: Yuka, long.  $41^{\circ} 40'$  E., lat.  $9^{\circ} 27'$  N., 1,710 m., in evergreen scrub by stream bed, on limestone, climbing to 4 m., flowers cream and red, March, No. 5454.

*Fluggea virosa* Baill.—F.W.T.A. 1: 291.

SOMALILAND: Duwai, long.  $44^{\circ} 15'$  E., lat.  $10^{\circ} 5'$  N., 1,200 m., in Buxus-Acokanthera scrub, shrub 2 m., flowers greenish, Oct., No. 4382.

ABYSSINIA: near Gobelli, long.  $41^{\circ} 59'$  E., lat.  $9^{\circ} 10'$  N., 1,680 m., on granite, March, No. 5257. Vernac.—*Elan-Damera* (Somali).

*Croton confertus* Baker in Kew Bull. 1895: 186.

SOMALILAND: Ali Wein Mt., long.  $45^{\circ} 15'$  E., lat.  $10^{\circ} 24'$  N., 540 m., in stony torrent-bed of limestone ravine, shrub 1 m. high, aromatic, flowers greenish, Jan., No. 4829.—Also in Arabia.

*Croton Cliffordii* Hutch. et E. A. Bruce, sp. nov. affinis *C. somalensi* Vatke et Pax, sed foliis plerumque ellipticis neque basi subcordatis nec apice acuminatis petiolis gracilioribus differt.

Frutex communis 1 m. altus; ramuli hornotini dense lepidostellati. Folia elliptica vel subovato-elliptica, basi rotundata et glandulis sessilibus ornata, apice obtusa vel rotundata, 3-5.5 cm. longa, 1.5-3 cm. lata, integra, leviter discoloria, supra viridia et molliter stellato-tomentella, infra cinereo-stellato-tomentella praecipue in costa media brunneo-lepidota, nervis lateralibus inconspicuis utrinsecus circiter 4; petioli graciles, usque 3.5 cm. longi. Racemi bisexuales, terminales, perbreves, basi flore ♀ pedicellato solitario. Flores masculi: pedicelli 3 mm. longi; sepalia ovato-triangularia, 3.5 mm. longa, extra stellato-tomentosa; petala sepalis leviter

longiora, anguste oblongeolata, pubescentia; stamina 10. *Flores foeminei*: pedicelli crassi, 1.5 mm. longi; sepala anguste ovato-triangularia, 3 mm. longa; petala 0; ovarium globosum, stellato-tomentosum; styli 4 mm. longi, bilobi, basin versus pubescentes.

SOMALILAND: Hargeisa, 1,290 m., common shrub 1 m. high among Acacias, flowers greenish, Sept., No. 4040 (type in Kew Herb). Vernac.—*Bahi-e*.

*C. macrostachys* Hochst.—F.T.A. 6, 1: 772; F.W.T.A. 1: 297.

ABYSSINIA: Mulkajibri, long. 42° 16' E., lat. 9° 24' N., 1,770 m., in hedges, tree 7 m. high, dioecious, Feb., No. 5088. Vernac.—*Bisana*.

*Cluytia abyssinica* Jaub. & Spach.—F.T.A. 6, 1: 807.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,340 m., in rank herbage, 1 m. high, fls. greenish, Feb., No. 5139.

*Jatropha Brockmannii* Hutch.—F.T.A. 6, 1: 787.

SOMALILAND: Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,500 m., on bare mountain slopes with scattered tree acacias, plant reddish, flowers yellow, Nov., No. 4588. Vernac.—*Jilbadig, Gedan*.—Endemic.

*J. glandulosa* Vahl—F.T.A. 6, 1: 793.

SOMALILAND: Berbera, sea level, in sub-desert and sand above coral rock island, 1 m. high, fls. and juice yellow, Jan., No. 4752. Vernac.—*Jilbadig*.—Also in Nubia, Eritrea and S. Arabia.

*J. palmatifida* Bak.—F.T.A. 6, 1: 787.

SOMALILAND: Hargeisa, 1,350 m., flowers greenish-yellow, Oct., No. 4245. Vernac.—*Jilbadig, Gedan*.—Endemic.

*J. Phillipseae* Rendle—F.T.A. 6, 1: 795.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 840 m., among Commiphora, etc., scrub on stony slopes, small shrub 1 m. high, fls. greenish, Oct., No. 4391. Vernac.—*Jilbadig, Ged An*.—Endemic.

*J. spinosa* (Forssk.) Vahl ex Blatter Fl. Aden, 330 (1915).

ADEN: 150–450 m., on lava slopes, shrub 1.5 m. high, flowers yellow, Mar., No. 5479.

var. *somalensis* Pax—F.T.A. 6, 1: 780.

SOMALILAND: Elmis, long. 44° 14' E., lat. 10° 22' N., 300–600 m., on mountain slopes in Commiphora, etc., open scrub, shrub 2 m. high, fls. yellow, Oct., No. 4407; Afard, long. 44° 8' E., lat. 10° 10' N., 540 m., Oct., No. 4457. Vernac.—*Jilbadig, Ged An*.

*J. parvifolia* Chiov. Nuov. Contrib. Somal. Ital. 18 (1934).

SOMALILAND: Dubriat Mt., long. 48° 10' E., lat. 10° 22' N., 300 m., on limestone slopes and in open scrub, fls. yellowish, Jan., No. 4795; Boundary Camp, 99, long. 44° 39' E., lat. 8° 47' N., 1,140 m., in deep soil, bush  $\frac{1}{2}$  m. high, very aromatic, Oct., No. 4138. Vernac.—*Jilbadig*.—Endemic.

*Chrozophora oblongifolia* (Del.) A. Juss.—F.T.A. 6, 1: 836.

SOMALILAND: Biji, long. 44° 5' E., lat. 10° 12' N., 420 m., in sand by big tug, strong woody herb 1 m. high, fls. greenish, Oct., No. 4514. Vernac.—*Mara mudo weyi*.—Also in Eritrea, Arabia and Socotra, and in Scind (India).



*Erythrococca abyssinica* Pax—F.T.A. 6, 1: 856.

ABYSSINIA: Harar, long. 42° 10' E., lat. 9° 20' N., 1,740 m., in hedges and evergreen scrub cultivation, 1 m. high, fls. greenish, Feb., No. 5046. Vernac.—*Ogomdih*—Also in Eritrea and Arabia.

*Acalypha fruticosa* Forssk.—F.T.A. 6, 1: 895.

SOMALILAND: Hargeisa, 1,290 m., on alluvium in shade of Acacia-Ziziphus thicket, shrub 1 m. high, infl. green, Sept., No. 3961. Vernac.—*Dirrhi*.

*A. indica* Linn.—F.T.A. 6, 1: 903.

SOMALILAND: Daraweina, long. 44° 10' E., lat. 9° 43' N., 1,110 m., in grass in shade of trees, Oct., No. 4288.

*Ricinus communis* Linn.—F.T.A. 6, 1: 945; F.W.T.A. 1: 306.

SOMALILAND: near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 930 m., on river banks, shrub 3 m. high, Oct., No. 4306. Vernac.—*Bor*.

*Tragia arabica* Baill. var. *parvifolia* Prain—F.T.A. 6, 1: 982.

SOMALILAND: Duwi Pass, long. 44° 15' E., lat. 10° 5' N., 1,200 m., in Buxus-Acokanthera scrub, a climbing, stinging herb, Oct., No. 4374. Vernac.—*Dubka*.

*T. brevipes* Pax—F.T.A. 6, 1: 983.

SOMALILAND: Hargeisa, 1,290 m., on alluvium in Acacia-Euphorbia thickets, a climber with greenish fls. and stinging leaves, Mar., No. 3963. Vernac.—*Gob daheyo*.

*Cephalocroton cordofanus* Hochst.—F.T.A. 6, 1: 844.

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., shrublet, fls. greenish-yellow, Oct., No. 4182. Vernac.—*Chimba*.

*Euphorbia breviarticulata* Pax—F.T.A. 6, 1: 582. *E. grandilobata* Chiov.

SOMALILAND: Barataga, long. 44° 1' E., lat. 10° 5' N., 1,290 m., on mountain top with scattered Buxus, ½ m. high, flowers yellow, Oct., No. 4519. Vernac.—*Dibu*.

*E. cuneata* Vahl—F.T.A. 6, 1: 545.

SOMALILAND: Afard, long. 44° 8' E., lat. 10° 10' N., 540 m., in Commiphora-bush-Acacia etc., open scrub on schist slopes, shrub with papery bark which peels off, flowers yellow, Oct., No. 4478. Aden, 210 m., on lava slopes, Mar., No. 5481. Vernac.—*Derender* (Somali).

*E. gossypina* Pax—F.T.A. 6, 1: 553.

SOMALILAND: Jebel Wotni Mt., long. 45° 6' E., lat. 10° 18' N., 360 m., on limestone slopes, ½ m. high, Jan., No. 4804. Vernac.—*En*.

*E. grandis* Lem.—F.T.A. 6, 1: 590.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,230 m., in Buxus scrub, occurs very sparingly on limestone, tree 8 m., flowers yellow, fruits coppery-red when ripe, Oct., No. 4414. Vernac.—*Hasadin*.

*E. granulata* Forssk.—F.T.A. 6, 1: 502.

SOMALILAND: Dubriat Mt., long. 45° 10' E., lat. 10° 22' N., 150 m., on limestone screes in lower open scrub, prostrate herb, flowers brown minute, glands red, Jan., No. 4780.

*E. infausta* N.E. Br.—F.T.A. 6, 1: 580.

SOMALILAND: Wobleh, long.  $43^{\circ} 17' E.$ ,  $10^{\circ} 15' N.$ , 1,200 m., on south-facing Mt. slopes with Commiphora etc. open scrub, succulent 1 m. high, flowers yellow, Nov., No. 4584. Vernac.—*Dibu*.—Also in Eritrea.

*E. inaequispina* N.E. Br.—F.T.A. 6, 1: 576.

SOMALILAND: Hargeisa, 1,410 m., 0.5 m. succulent, fls. yellow, Oct., No. 4256. Hargeisa, 1,410 m., on sandstone rocks, succulent  $\frac{1}{2}$  m. high, fls. yellow, Oct., No. 4256; Raréle Mt., long.  $43^{\circ} 15' E.$ , lat.  $10^{\circ} N.$ , 1,800 m., Dec., No. 4729. Vernac.—*Dadan*.—Endemic.

*E. longecornuta* Pax—F.T.A. 6, 1: 535.

ABYSSINIA: Gara mulata Mt., long.  $41^{\circ} 48' E.$ , lat.  $9^{\circ} 12' N.$ , 2,700 m., rank herbage to evergreen forest, stems red, Mar., No. 5298, No. 5339.

*E. longetuberculosa* Hochst.—F.T.A. 6, 1: 558.

SOMALILAND: Afard, long.  $44^{\circ} 8' E.$ , lat.  $10^{\circ} 10' N.$ , 540 m., on schist slopes in Commiphora open scrub, fls. yellow and red, Oct., No. 4453. Vernac.—*Ged ambar*.

*E. monacantha* Pax—F.T.A. 6, 1: 565.

SOMALILAND: Duwi Pass, long.  $44^{\circ} 15' E.$ , lat.  $10^{\circ} 5' N.$ , 1,080 m., in tree acacia grass and rocky places, fls. yellow, Oct., No. 4379. Vernac.—*Donedugh*.

*E. nigrispina* N.E. Br.—F.T.A. 6, 1: 574.

SOMALILAND: near Duwi, long.  $44^{\circ} 12' E.$ , lat.  $10^{\circ} 8' N.$ , 660 m., level sandy ground with Acacia, shrub  $\frac{1}{2}$  m. high, fls. yellow, Oct., No. 4440; near Eil Demet, long.  $44^{\circ} 17' E.$ , lat.  $9^{\circ} 53' N.$ , 990 m., on lava rocks, 2 dm. high, fls. yellow, stem 4-5 angled, Oct., No. 4308. Vernac.—*Dibu*.—Endemic.

*E. nubica* N.E. Br.—F.T.A. 6, 1: 554.

SOMALILAND: Hargeisa, 1,290 m., on level ground with aloes and acacias, 3 m. high, dominant, Sept., No. 3950. Vernac.—*Ergin*.

*E. polyacantha* Boiss.—F.T.A. 6, 1: 578.

ABYSSINIA: Kofajalo, long.  $41^{\circ} 51' E.$ , lat.  $9^{\circ} 9' N.$ , 2,250 m., on limestone in Juniper-forest association, shrub 2 m. high, fls. yellow, fruit purplish-green, Mar., No. 5275.—Endemic.

*E. polycremoides* Hochst.—F.T.A. 6, 1: 506.

SOMALILAND: Afard, long.  $44^{\circ} 8' E.$ , lat.  $10^{\circ} 10' N.$ , 690 m., on basalt rocks in Commiphora open scrub, Oct., No. 4451. Buramo-Warieto tug, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} 2' N.$ , 1,080 m., stems reddish, Jan., No. 4910.

*E. pseudoholstii* Pax—F.T.A. 6, 1: 521.

SOMALILAND: Boundary Pillar 93, long.  $45^{\circ} 9' E.$ , lat.  $8^{\circ} 37' N.$ , 990 m., rather bare ground, Oct., No. 4221. Vernac.—*En*.—Endemic.

*E. Robecchii* Pax—F.T.A. 6, 1: 583.

SOMALILAND: Burmado, long.  $43^{\circ} 50' E.$ , lat.  $10^{\circ} 13' N.$ , 810 m., on mt. slopes in upper Commiphora and open scrub, tree to 4 m. high, fls. yellow, Nov., No. 4538. Vernac.—*Darkain*.—Endemic.

*E. rubella* Pax—F.T.A. 6, 1: 560.

ABYSSINIA: Harar, long.  $42^{\circ} 6' E.$ , lat.  $9^{\circ} 18' N.$ , 1,950 m., limestone mountains in evergreen forest formation, leafless, inflorescence pale pink, Feb., No. 5007.—Endemic.

*E. scoparia* N.E. Br.—F.T.A. 6, 1: 557.

SOMALILAND: Barataga, long.  $44^{\circ} E.$ , lat.  $10^{\circ} 5' N.$ , 1,290 m., Mt. top in scattered *Buxus* scrub and on limestone, 1 m. high, fls. yellow, Oct., No. 4521. Bir Dai, long.  $44^{\circ} 17' E.$ , lat.  $9^{\circ} 55' N.$ , 870 m., on dry alluvial soil in upper *Commiphora* etc. open scrub, shrub 8 m. high, fls. yellow, floral bracts white, conspicuous, Oct., No. 4342. Vernac.—*Mirhig yer*, *Mirhig*.

*E. somalensis* Pax—F.T.A. 6, 1: 550.

SOMALILAND: Duwi, long.  $44^{\circ} 15' E.$ , lat.  $10^{\circ} 5' N.$ , 840–960 m., on steep rocky slopes in *Commiphora* scrub, very common in heavily grazed parts, shrub 3 m. high, leaves grey, Oct., No. 4384. Vernac.—*Falla Falla*.—Endemic.

*E. systyla* Edgew.—F.T.A. 6, 1: 519.

ADEN: 150 m., on lava slopes, 40 cm. high, fls. dark red, Mar., No. 5483.—Also in Somaliland and Arabia.

*E. Thi* Schweinf.—F.T.A. 6, 1: 581.

SOMALILAND: Afard, long.  $44^{\circ} 8' E.$ , lat.  $10^{\circ} 10' N.$ , 600 m., on slopes with *Commiphora* and in open scrub, shrub 2 m. high, fls. yellow, Oct., No. 4480. Vernac.—*Dibu*.

*E. triaculeata* Forssk.—F.T.A. 6, 1: 564.

SOMALILAND: Hargeisa, a common succulent in stony places, fls. yellow, stem mottled, Oct., No. 4268; Afard, 510 m., Oct., No. 4482.

*E. turbiniformis* Chiov. Fl. Somala 304, tab. 35, fig. 1 (1929) (ex descr. et ic.).

SOMALILAND: Hargeisa, 1,350 m., on stony ground, limestone and sandstone, a succulent, top flush with ground, fls. yellow, sap smelling of coconut, Oct., No. 4241.—Endemic.

## ROSACEAE.

*Alchemilla cryptantha* Steud.—F.T.A. 2: 377.

ABYSSINIA: Near Kofajalo, long.  $46^{\circ} 51' E.$ , lat.  $9^{\circ} 9' N.$ , 2,310 m., by stream in open place of *Podocarpus* forest association, prostrate herb, fls. greenish yellow, Mar., No. 5281.

*A. kiwuensis* Engl. in Wiss. Ergebn. Deutsch. Zentr.-Afr. Exped. 2: 225 (1911).

ABYSSINIA: Gara mulata Mt., long.  $41^{\circ} 48' E.$ , lat.  $9^{\circ} 12' N.$ , 3,000 m., Mt. top, on limestone in open grass, stems red, fls. yellowish-green, Mar., No. 5316.

*A. pedata* Hochst.—F.T.A. 2: 379.

ABYSSINIA: Kondudo Mt., long.  $42^{\circ} 20' E.$ , lat.  $9^{\circ} 27' N.$ , 2,760 m., on mt. top in marshy hollow, fls. greenish-yellow, Feb., No. 5220; Gorla-Kolubi track, long.  $41^{\circ} 45' E.$ , lat.  $9^{\circ} 22' N.$ , 2,610 m., leaves silvery, Mar., No. 5398.

*Rubus apetalus* Poir.—F.T.A. 2: 374; F.W.T.A. 1: 314. R. exsuccus Steud. ex A. Rich. Fl. Abyss. 1: 256 (1847).

ABYSSINIA: Gara mulata mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,580 m., on limestone, in evergreen forest, scandent, corolla very variable in size, white or pale pink, filaments crimson, 4 Mar., No. 5354. Vernac.—*Unjori*.

*R. Volkensii* Engl. Bot. Jahrb. 19: Beibl. 47: 30 (1894). R. Chiesae Chiov. in Ann. di Bot. 9: 319 (1911).

ABYSSINIA: Gorla: long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,580 m., on limestone in evergreen forest, erect 2 m. high, thorns red, fls. pale cream, Mar., No. 5296.

*Hagenia abyssinica* Willd.—F.T.A. 2: 380 (as *Brayera anthelmintica Kunth*).

ABYSSINIA: Sarerta Mt., long.  $42^{\circ} 19'$  E., lat.  $9^{\circ} 30'$  N., 2,400 m., on edge of evergreen forest, tree 6 m. high, 23 Feb., No. 5178. Vernac.—*Koso*.

*Potentilla reptans* Linn.—F.T.A. 2: 376.

ABYSSINIA: Galla Pass, long.  $42^{\circ} 19'$  E., lat.  $9^{\circ} 28'$  N., 2,250 m., on limestone by stream, prostrate herb, fls. yellow, Feb., No. 5169.

*Rosa abyssinica* R. Br.—F.T.A. 2: 381.

ABYSSINIA: Harar, long.  $42^{\circ} 6'$  E., lat.  $9^{\circ} 18'$  N., 1,890 m., on limestone, climbing or suberect, corolla white, Feb., No. 5031. Vernac.—*Ga-aga*.—Also in Eritrea.

*Pygeum africanum* Hook. f.—F.T.A. 2: 373; F.W.T.A. 1: 314.

ABYSSINIA: Boesesa valley, long.  $42^{\circ} 18'$  E., lat.  $9^{\circ} 29'$  N., 2,010–2,400 m., in evergreen forest, codominant with *Podocarpus*, tree 30 m., fr. dark red, Feb., No. 5173. Vernac.—*Tugoringetz*; *Mukoraja*.

#### CAESALPINIACEAE.

*Delonix elata* Gamble—Bak. f. Leg. Trop. Afr. 624 (1926–30). *Poinciana elata* Linn.—F.T.A. 2: 266.

SOMALILAND: Boundary Pillar 93, long.  $45^{\circ} 9'$  E., lat.  $8^{\circ} 37'$  N., 990 m., tree to 5 m., Oct., No. 4195; Aden, 150 m., on lava, Mar., No. 5511. Vernac.—*Lebi* (Somali).

*Tamarindus indica* Linn.—F.T.A. 2: 308; Bak. f. l.c. 702.

SOMALILAND: Daraweina tug, long.  $44^{\circ} 8'$  E., lat.  $9^{\circ} 40'$  N., 1,170 m., tree 10 m., fls. cream veined with crimson, Oct., No. 4281. Vernac.—*Hamar*.

*Cassia acutifolia* Del.—F.T.A. 2: 278; Bak. f. l.c. 637.

SOMALILAND: Boundary, long.  $44^{\circ} 15'$  E., lat.  $8^{\circ} 58'$  N., 1,260 m., on shallow soil in Acacia-grass veldt, suffruticose, fls. yellow, Sept., No. 4100; Dubriat mt., long.  $5^{\circ} 10'$  E., lat.  $10^{\circ} 22'$  N., 150 m., limestone slopes, 2 m. high, fls. yellow, Jan., No. 4778. Vernac.—*Jalelo gel*.

*C. adenensis* Benth.—Bak. f. l.c. 637.

ADEN: 150 m., on lava, 1–1.5 m. high, fls. yellow, Mar., No. 5513.—Also in Somaliland.

*C. Aschrek* Forssk. Fl. Aegypt. Arab. 86 (1775). *C. obovata* Collad.—F.T.A. 2 : 277 ; Bak. f. l.c. 636.

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., on bare ground in open scrub, Oct., No. 4151 ; Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., on alluvium, fls. yellow, Sept., No. 4018. Vernac.—*Jalelo*.

*Cassia holosericea* Fresen.—F.T.A. 2 : 278 ; Bak. f. l.c. 636.

SOMALILAND : Berbera, sea level, sandy and shingly plain prostrate herb, fls. yellow, Jan., No. 4749. Vernac.—*Jalelo ari*.

*C. mimosoides* Linn.—F.T.A. 2 : 280 ; Bak. f. l.c. 642.

ABYSSINIA : Mulka jibri, long. 42° 16' E., lat. 9° 24' N., 1,650 m., in hedges, shrub 1 m. high, Feb., No. 5084.

*Cadia purpurea* Ait.—Bak. f. l.c. 603. *C. varia* L'Hérit.—F.T.A. 2 : 255.

SOMALILAND : Hargeisa, long. 44° E., lat. 9° 35' N., 1,350 m., on sandstone rocks, shrub 3 m. high, 13 Oct., No. 4251. Vernac.—*Salalma*.

ABYSSINIA : Kolubi-Harar Road, long. 41° 40' E., lat. 9° 27' N., 1,740 m., on limestone slopes, 2-3 m. high, fls. cream or purple, Mar., No. 5459. Vernac.—*Saele*.

*Pterolobium exosum* (Gmel.) Bak. f.—Bak. f. l.c. 621.

SOMALILAND : Libah Mele mt., long. 43° E., lat. 10° 20' N., 1,410 m., by spring in lower Buxus scrub, Dec., No. 4700.

ABYSSINIA : Harar, long. 42° 10' E., lat. 9° 20' N., 1,590 m., climber or suberect, Feb., No. 5043. Vernac.—*Kantafa*, *Libah Halalalis* (Somali).

*Caesalpinia Gillettii* Hutch. et E. A. Bruce, sp. nov. affinis *C. eriantherae* Chiov., sed foliolis minute pubescentibus, pedicellis annulo pilorum brevium instructis, antheris glabris differt.

Frutex usque ad 3 m. altus, aculeatus ; rami flexuosi, pubescentes. *Folia* bipinnata ; pinnae 2-4-jugatae, circiter 4 cm. longae ; foliola 6-8-jugata, oblongo-elliptica, apice mucronata, basi inaequaliter rotundata, 4-6 mm. longa, 2-3 mm. lata, uninervia, minute pubescentia. *Racemi* in ramulis abbreviatissimis terminales, pauciflori ; bractae lanceolatae, 1.25 mm. longae, pubescentes ; pedicelli circiter 5 mm. longi, medio annulo pilorum brevium instructi. *Lobi calycis* lanceolati, acuti, 4 mm. longi, parce pubescentes. *Petala* inaequalia, uno late obovato 9 mm. longo et 4.5 mm. lato flavo, ceteris minoribus late lanceolatis pallidis. *Filamenta* leviter pubescentia. *Ovarium* breviter stipitatum, oblique oblongum, glabrum ; stylus 2 mm. longus. *Fructus* oblongo-lanceolatus, utrinque attenuatus, 8-10 cm. longus, 1.5-1.8 cm. latus, 3-4-spermus, longitudinaliter nervoso-reticulatus. *Semina* quadrato-orbicularia, 7 mm. diametro, maculata.

SOMALILAND : Marmar range, long. 42° 47' E., lat. 10° 29' N., 1,050 m., on limestone slopes, shrub 3 m. high, 27 Dec., No. 4660. Weranwis valley, long. 43° 50' E., lat. 10° 15' N., 510 m., bush 2 m., 1 Nov., No. 4531. Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., bush 2 m. high, fls. yellow, 5 Oct., No. 4157 (type in Kew Herb.). Vernac.—*Hria gorleh* ; *Lebi yer* ; *Lumba*.

# MIMOSACEAE.

*Entada abyssinica* Steud.—F.T.A. 2 : 327 ; Bak. f. l.c. 789.

ABYSSINIA : Gafra valley, long. 42° 13' E., lat. 9° 21' N., 1,500 m., on granite near stream, tree 8 m. high, fls. yellow, Feb., No. 5238. Vernac.—*Kantafa*.

*Dichrostachys glomerata* (Forssk.) Chiov.—Bak. f. l.c. 807.

SOMALILAND : Daraweina, long. 44° 10' E., lat. 9° 4' N., 1,110 m., on sand, tree 5 m. high, fls. yellow and pink, Oct., No. 4287. Vernac.—*God han torle*.

*Acacia albida* Del.—F.T.A. 2 : 339 ; Bak. f. l.c. 825.

SOMALILAND : Buramo, Mendesa tug, long. 43° 20' E., lat. 9° 45' N., 1,590 m., on limestone by stream-bed, tree 12 m. high, the most massive *Acacia* seen in Somaliland, fruits dark yellow, conspicuous, Jan., No. 4839. Vernac.—*Garabi*.

*A. arabica* Willd.—F.T.A. 2 : 350 ; Bak. f. l.c. 849.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., tree 5 m. high, fls. yellow, Sept., No. 3948, partly. Vernac.—*Marah*.

*A. Asak* Willd.—Bak. f. l.c. 826.

SOMALILAND : Duwi, lat. 10° 5' N., 44° 15' E., shrub 1–2 m., Oct., No. 4427. Vernac.—*Adad Medu*.

*A. Bussei* Harms—Bak. f. l.c. 825.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., dominant, 5 m., fls. cream, Sept., No. 3956. Vernac.—*Galol*.

*A. Edgeworthii* Anders. in Journ. Linn. Soc. 5 : Suppl. 18 (1860).

ADEN : 210 m., 0.5 m., fls. cream, Mar., No. 5507.—Endemic.

*A. etbaica* Schweinf.—F.T.A. 2 : 349 ; Bak. f. l.c. 840.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., tree 4 m., fls. cream, Sept., No. 3934. Duwi, long. 44° 15' E., lat. 10° 5' N., 1,050–1,200 m., dominant tree 3 m., Oct., No. 4398.

ABYSSINIA : Gobelli, long. 41° 59' E., lat. 9° 10' N., 1,710 m., on granite slope in evergreen scrub, tree 4 m., Mar., No. 5269. Vernacs.—*Yurar* ; *Yube* ; *Sugsug*.

*A. glaucophylla* Steud.—F.T.A. 2 : 342 ; Bak. f. l.c. 827.

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 1,020–1,170 m. ; on fringes of *Buxus* scrub, tree 6 m. with well-defined bole, Oct., No. 4396. Vernac.—*Réde*.

*A. mellifera* Benth.—F.T.A. 2 : 340 ; Bak. f. l.c. 828.

SOMALILAND : Boundary, long. 44° 15' E., lat. 8° 55' N., 1,260 m., *Acacia*-grass veldt, tree 4 m., fls. cream, Sept., No. 4083. Vernac.—*Bilel*.

*A. misera* Vatke in Oesterr. Bot. Zeit. 30 : 275 (1880).

SOMALILAND : Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., tree 4 m. usually branching near the base, Oct., No. 4124. Dubar, long. 45° 5' E., lat. 10° 20' N., 300 m., mt. slopes on coralline limestone and sandstone, shrub 2 m., fls. pale yellow, Jan., No. 4769. Vernac.—*Khansa*—Endemic.

*A. Nefasia* (Hochst. ex A. Rich.) Schweinf. (*A. abyssinica* Hochst.—F.T.A. 2: 347).

ABYSSINIA: Slopes of Sareta Mt., long.  $42^{\circ} 19'$  E., lat.  $9^{\circ} 30'$  N., 2,400 m., shrub 3 m., Feb., No. 5187. Vernac.—*Gurar*.

*A. nilotica* Del.—F.T.A. 2: 350 (sub *A. arabica* Willd.).

SOMALILAND: Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 32'$  N., 1,290 m., tree 5 m., fls. yellow, Sept., No. 3948, partly. Vernac.—*Marah*.

*A. orfota* Schweinf.—Bak. f. l.c. 839.

SOMALILAND: Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,290 m., on dry alluvium, tree 2 m., branching from base, fls. cream, Sept., No. 4024. Vernac.—*Gummur*.

*A. pennata* Willd.—F.T.A. 2: 345; Bak. f., l.c. 853.

ABYSSINIA: Harar, long.  $42^{\circ} 10'$  E., lat.  $9^{\circ} 20'$  N., 1,680 m., in evergreen scrub formation, bush 2-3 m., Feb., No. 5047. Vernac.—*Kwanta*.

*A. Senegal* Willd.—Bak. f. l.c. 827.

SOMALILAND: Hargeisa, long.  $44^{\circ} 3'$  E., lat.  $9^{\circ} 33'$  N., 1,260 m., tree 5 m. high, fls. cream, Sept., No. 3954; 4066. Vernac.—*Adad*. Boundary Pillar 93, long.  $45^{\circ} 9'$  E., lat.  $8^{\circ} 37'$  N., 990 m., shrub 2 m., Oct., No. 4178. Vernac.—*Jalefon*.

ABYSSINIA: Gobelli, long.  $41^{\circ} 59'$  E., lat.  $9^{\circ} 10'$  N., 150 m., Mar., No. 5261.

*A. Seyal* Del.—F.T.A. 2: 351; Bak. f. l.c. 844.

SOMALILAND: Afard, long.  $44^{\circ} 8'$  E., lat.  $10^{\circ} 8'$  N., 1,170 m., on plateau, in Acacia-grass veld, tree 5 m., stem white, Oct., No. 4465.

ABYSSINIA: ridge south of Hara, long.  $42^{\circ} 6'$  E., lat.,  $9^{\circ} 17'$  N., 1,950 m., on granite in lower evergreen formation, tree 7 m., Mar., No. 5250. Vernac.—*Wadi* (Somali); *Wajo* (Abyssinian).

*A. Sieberiana* DC.—F.T.A. 2: 347; Bak. f. l.c. 836.

SOMALILAND: Afard, long.  $44^{\circ} 8'$  E., lat.  $10^{\circ} 10'$  N., 510 m., on sandy soil dominant up to 900 m., found up to 1,500 m., low flat topped bushes  $\frac{1}{2}$ -1 m. high, Oct., No. 4443. Vernac.—*Jerin*.

*A. somalensis* Vatke—Bak. f. l.c. 833.

SOMALILAND: Afard, long.  $44^{\circ} 8'$  E., lat.  $10^{\circ} 10'$  N., 540 m. on schist slopes, bush 2 m., fls. lemon, Oct., No. 4458. Vernac.—*Hini*.—Endemic.

*A. spirocarpa* Hochst.—Bak. f. l.c. 842.

SOMALILAND: Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 38'$  N., 1,290 m., tree 8 m., dominant, Sept., No. 3910.

ABYSSINIA: Gobelli, long.  $41^{\circ} 59'$  E., lat.  $9^{\circ} 10'$  N., on granite, tree 4-5 m., Mar., No. 5260. Vernac.—*Gurha*.

*Albizzia anthelmintica* Brongn.—F.T.A. 2: 357; Bak. f. l.c. 859.

SOMALILAND: Boundary, long.  $44^{\circ} 10'$  E., lat.  $8^{\circ} 57'$  N., 1,260 m., tree to 6 m. high, fls. white-reddish, Sept., No. 4095. Vernac.—*Rhideb*.

PAPILIONACEAE.

*Calpurnia subdecandra* (L'Herit.) Schweickerdt in Bothalia 3 : 237 (1937). *C. aurea* Benth.—Bak. f. Leg. Trop. Afr. 593.

ABYSSINIA : Harar, long.  $42^{\circ} 6' E.$ , lat.  $9^{\circ} 18' N.$ , 1,920 m., on limestone, 1 m., fls. yellow, Feb., No. 5008. Vernac.—*Degita*.

*Dalbergia commiphoroides* Bak. f. Leg. Trop. Afr. 521.

SOMALILAND : Boundary Pillar 93, long.  $45^{\circ} 9' E.$ , lat.  $8^{\circ} 37' N.$ , 990 m., bush 3 m., fls. white, in open scrub, Oct., No. 4153. Vernac.—*Duya*.—Endemic.

*Tephrosia atrovioleacea* Bak. f. ex De Willd.—Bak. f. l.c. 214.

ABYSSINIA : S.W. slopes of Kondudo Mt., long.  $42^{\circ} 18' E.$ , lat.  $9^{\circ} 27' N.$ , 2,100 m., on limestone slopes, shrub 3 m., Feb., No. 5104.

*T. barbiger* Welw. ex Bak.—F.T.A. 2 : 113 ; Bak. f. l.c. 196.

ABYSSINIA : Mulka jibri, long.  $42^{\circ} 16' E.$ , lat.  $9^{\circ} 24' N.$ , 1,620 m., shrub 2 m., in lower evergreen formation, Feb., No. 5103. Vernac.—*Kisa*.

*T. obbiadensis* Chiov. Fl. Somalia 144, tab. 7, fig. 2 ; Bak. f. l.c. 882.

SOMALILAND : Afard, long.  $44^{\circ} 8' E.$ , lat.  $10^{\circ} 10' N.$ , 540 m., in open scrub on schist slopes, shrub 1 m., fls. crimson, Oct., No. 4469. Vernac.—*Ged hajin*.—Endemic.

*T. purpurea* Pers.—F.T.A. 2 : 124 ; Bak. f. l.c. 190.

SOMALILAND : Elmis, long.  $44^{\circ} 14' E.$ , lat.  $10^{\circ} 20' N.$ , 240 m., on sandy plain in desert-grass community, herb, fls. red, Oct., No. 4492. Near Eil Demet, long.  $44^{\circ} 17' E.$ , lat.  $9^{\circ} 53' N.$ , 960 m., Oct., No. 4319, partly.

*Tephrosia Franchetii* Hutch. et E. A. Bruce, nom. nov. *T. simplicifolia* Franch. (1882), non F. Muell. ex Benth. (1864).

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 35' N.$ , 1,350 m., on stony hills, fls. pink, Sept., No. 4033.

*T. uniflora* Pers.—Bak. f. l.c. 184.

SOMALILAND : near Eil Demet, long.  $44^{\circ} 17' E.$ , lat.  $9^{\circ} 53' N.$ , 960 m., on lava slope, fls. pink, Oct., No. 4319 partly.

*T. vicioides* A. Rich.—F.T.A. 2 : 117.

SOMALILAND : Camp 4, long.  $44^{\circ} 16' E.$ , lat.  $10^{\circ} N.$ , 1,080 m., Oct., No. 4358 ; Elmis, long.  $44^{\circ} 14' E.$ , lat.  $10^{\circ} 20' N.$ , 240 m., on sandy plains, Oct., No. 4494. Vernac.—*Geldabar*.

*Sesbania Sesban* (L.) Merrill in Philipp. Journ. Sci. Bot. 7 : 235 (1912). *S. aegyptiaca* Pers.—F.T.A. 2 : 134 ; Bak. f. l.c. 259.

SOMALILAND : Biji, long.  $44^{\circ} 5' E.$ , lat.  $10^{\circ} 12' N.$ , 420 m., among Tamarix, shrub 3 m., Oct., No. 4515 ; near Daba Bur, long.  $43^{\circ} 6' E.$ , lat.  $9^{\circ} 59' N.$ , 1,470 m., 1 m., Nov., No. 4612 ; long.  $44^{\circ} 18' E.$ , lat.  $9^{\circ} 57' N.$ , 840 m., Oct., No. 4350.



*Indigofera arabica* Jaub. & Spach—F.T.A. 2: 103; Bak. f. l.c. 165.

SOMALILAND: Debrawen, long. 42° 49' E., lat. 10° 26' N., 960 m., on overgrazed stony plains, fls. red, 26 Nov., No. 4653; Buramo, Warieto, long. 43° 10' E., lat. 10° 2' N., 1,260 m. in stony stream bed, Feb., No. 4915. Vernac.—*Elas*.

*I. argentea* Linn.—F.T.A. 2: 97; *I. articulata* Gouan—Bak. f. l.c. 154.

SOMALILAND: long. 45° 9' E., lat. 8° 37' N., 990 m., fls. dingy yellow, Oct., No. 4171; Gorfulai, long. 43° 38' E., lat. 10° 16' N., 480 m., fls. red within, green without, Nov., No. 4553; Debrawen, long. 42° 10' E., lat. 10° 5' N., on alluvial limestone, 1 m., fls. red and green, Feb., No. 4930. Vernac.—*Dureho*.

*I. arrecta* Hochst. ex A. Rich.—F.T.A. 2: 97; Bak. f. l.c. 155.

SOMALILAND: Mt. Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,350 m., on gneiss slopes in open wood and evergreen scrub, 40 cm., Feb., No. 4990.

*I. brevicalyx* Bak. f.—Bak. f. l.c. 114.

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 27' N., 1,980 m., on limestone slopes in evergreen scrub, fls. red, Mar., No. 5452.

*I. intricata* Boiss. Fl. Orient. 2: 190 (1872).

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., open ground, fls. red, Sept., No. 3951; Weramwis valley, long. 43° 50' E., lat. 10° 15' N., on sand with Balanites and bush acacias, suffruticose 40 cm., fls. red, Nov., No. 4532. Vernac.—*Hajin*.—Also in Arabia and S. Persia.

*I. oblongifolia* Forssk.—Bak. f. l.c. 138. *I. paucifolia* Del.—F.T.A. 2: 88.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,110 m., a small shrub on fringe of Buxus scrub, Oct., No. 4401; Dubriat Mt., long. 45° 10' E., lat. 10° 22' N., 2,400 m., on limestone slopes, 30 cm. high, Jan., No. 4794.

*I. parvula* Del.—F.T.A. 2: 81; Bak. f. l.c. 136.

ABYSSINIA: near Fujan Hunjuba, long. 42° 17' E., lat. 9° 26' N., 1,950 m., a prostrate herb on granite, Feb., No. 5233.

*I. Phillipsiae* Bak. f.—Bak. f. l.c. 136.

SOMALILAND: Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., in Acacia association, Oct., No. 4109. Vernac.—*Ged Hajin*.

*I. Rothii* Bak.—F.T.A. 2: 77; Bak. f. l.c. 114.

ABYSSINIA: Kondudo Mt., long. 42° 20' E., lat. 9° 27' N., 2,280 m., on limestone, 1.5 m. high, fls. red, Feb., No. 5230.—Endemic.

*I. Ruspoli* Bak. f. l.c. 109.

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' E., 990 m., shrublet, 2 m., fls. red, Oct., No. 4217. Biji, long. 44° 5' E., lat. 10° 12' N., 420 m., Oct., No. 4510. Vernac.—*Jelub*.—Endemic.

*I. semitrijuga* Forssk.—F.T.A. 2: 93; Bak. f. l.c. 147.

SOMALILAND: Berbera, sea level, prostrate herb with red fls., Jan., No. 4751.

*I. spinosa* Forssk.—F.T.A. 2: 77; Bak. f. l.c. 113.

SOMALILAND: Elmis, long. 44° 14' E., lat. 10° 20' N., 240 m., on sandy plain in desert grass, silvery, suffruticose, fls. red, Oct., No. 4486; No. 4495. Vernac.—*Hajin*.

*I. tritoides* Bak.—Bak. f. l.c. 108.

SOMALILAND: Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,200 m., on gneiss hills, fls. red, Feb., No. 4969.—Endemic.

*Crotalaria aegyptiaca* Benth.—Bak. f. Legum. Trop. Afr. 25 (1926).

SOMALILAND: Elmis, long. 44° 14' E., lat. 10° 20' N., 270 m., on sandy plains, small shrub 30 cm., Nov., No. 4485.

*C. agatiflora* Schweinf.—Bak. f. l.c. 38.

ABYSSINIA: Harar, long. 42° 10' E., lat. 9° 20' N., 1,650 m., on granite in evergreen scrub, fls. yellow speckled with purple, Feb., No. 5065.

*C. albicaulis* Franch.—Bak. f. l.c. 45.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., on alluvial calcareous soil, suffruticose, Sept., No. 3959. Vernac.—*Assuro*.—Endemic.

*C. Comanestiana* Schweinf.—Bak. l.c. 39.

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., fls. yellow, Oct., No. 4162. Vernac.—*Assuro*.—Endemic.

*C. Deflersii* Schweinf.—Bak. f. l.c. 47.

SOMALILAND: Kabrih Bahr, long. 43° 44' E., lat. 10° 20' N., 450 m., 1 m. high, Nov., No. 4545. Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,110 m., Feb., No. 4978. Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,110 m., gneiss slopes, 30 cm. high, fls. yellow, Feb., No. 4978.

*C. dumosa* Franch.—Bak. f. l.c. 33.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., on dry alluvium, Sept., No. 4042; Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., Oct., No. 4152; near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 990 m., Oct., No. 4316; Afard, long. 44° 8' E., lat. 10° 10' N., 690 m., lava plateau, Oct., No. 4473; Debrawen, long. 42° 49' E., lat. 10° 26' N., 960 m., on stony plain, Nov., No. 4652; Buramo, long. 43° 10' E., lat. 10° N., 1,410 m., on gneiss slopes, Jan., No. 4869; 4892. Vernac.—*Hajin*.—Endemic.

*C. Erlangeri* Harms—Bak. f. l.c.

ABYSSINIA: Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,790–3,300 m., on limestone in upper evergreen forest, shrub 3 m., Mar., No. 5308.—Endemic.

*C. lachnocarpoides* Engl.—Bak. f. l.c. 39.

ABYSSINIA: near Mulka jibri, long. 42° 16' E., lat. 9° 24' N., 1,710 m., 6 m., fls. yellow, Feb., No. 5235.—Also in Tanganyika.

*C. laxa* Franch.—Bak. f. l.c. 52.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., in tree acacia formation, fls. yellow, Sept., No. 3919. Ohob Pass, long. 43° 13' E., lat. 10° 11' N., 1,140 m., Feb., No. 4943. Ohob Pass, long. 43° 13' E., lat. 10° 11' N., 1,140 m., on limestone, fls. yellow, Feb., No. 4943.

*C. microphylla* Vahl.—F.T.A. 2 : 16 ; Bak. f. l.c. 56.  
SOMALILAND : Las Dawan, long. 45° 12' E., lat. 10° 20' N., 150 m., shingly slopes, prostrate herb, fls. pink, Jan., No. 4808.

*C. petiolaris* Franch.—Bak. f. l.c. 38.

SOMALILAND : near Jif pass, long. 43° E., lat. 10° 20' N., 1,440 m., on limestone rocks beside stream, glaucous plant 2 m. high, fls. yellow, Dec., No. 4714. Vernac.—*Wahara mālē*.

*C. Phillipsiae* Bak.—Bak. f. l.c. 48.

SOMALILAND : Buramo, long. 43° 10' E., lat. 10° N., 1,440 m., on gneiss slopes, 30 cm. high, Jan., No. 4862.

*C. pycnostachya* Benth.—Bak. f. l.c. 49.

SOMALILAND : Deriodera, long. 42° 55' E., lat. 10° 3' N., 1,170 m., on rocks, 1 m. high, Nov., No. 4640. Vernac.—*Shuna shuna*.

*C. retusa* Linn.—F.T.A. 2 : 13 ; Bak. f. l.c. 28.

ABYSSINIA : Harar, long. 42° 10' E., lat. 9° 20' E., 1,650 m., on granite, ½ m. high, Feb., No. 5062.

*C. Saltiana* Andrews—Bak. f. l.c. 37.

SOMALILAND : Buramo, long. 43° 10' E., lat. 10° N., 1,410 m., in open wood on alluvial flats, 20 cm. high, fls. yellow, Jan., No. 4845. Vernac.—*Gobol Deye*.

ADEN : 800 ft., fls. yellow, Mar., No. 5499.

*Argyrolobium ramosissimum* Bak.—F.T.A. 2 : 46 ; Bak. f. l.c. 63.

ABYSSINIA : Gara mulata mt., long. 41° 48' E., lat. 9° 12' N., 3,000 m., on limestone, fls. yellow, Mar., No. 5315, 5372, 5373. Kondudo Mt., long. 42° 20' E., lat. 9° 27' N., 2,760 m., mt. top, fls. yellow, Feb., No. 5223.—Endemic.

*A. virgatum* Bak.—Bak. f. l.c. 63.

ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 3,000 m., on limestone at mt. top, fls. yellow, Mar., No. 5350.

*Lotus arabicus* Linn.—F.T.A. 2 : 62 ; Bak. f. l.c. 90 ; F.W.T.A. 1 : 399.

ABYSSINIA : Kofajalo, long. 41° 51' E., lat. 9° 9' N., 180 m., on limestone in grazed marshy places, fls. yellow-orange, Mar., No. 5278.

*Lotus corniculatus* Linn.—F.T.A. 2 : 63 ; Bak. f. l.c. 88.

ABYSSINIA : Haramaia, long. 42° E., lat. 9° 24' N., 1,980 m., close grass sward on border of salt pan, prostrate herb, Mar., No. 5466.

*Trifolium semipilosum* Fres.—F.T.A. 2 : 56 ; Bak. f. l.c. 80.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 25' N., 2,250 m., on limestone, fls. white, Feb., No. 5112.

*Medicago denticulata* Willd.—F.T.A. 2 : 51 ; Bak. f. l.c. 73.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 27' N., 2,250 m., Feb., No. 5115.

*M. lupulina* Linn.—F.T.A. 2 : 51 ; Bak. f. l.c. 72.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,280 m., prostrate, fls. yellow, 21 Feb., No. 5114.

*Rhynchosia buramensis* Hutch. et E. A. Bruce, sp. nov. foliis minimis, inflorescentiis bifloris, calycis lobis subulatis, seminibus caeruleis valde distincta.

Frutex scandens; rami vetustiores cortice cinereo fisso, hornotini graciles, purpurascentes et minute pubescentes. *Folia* breviter petiolata, petiolo vix 1 cm. longo; foliola utrinque minute pubescentia, infra glanduloso-punctata, terminali rhomboideo subacuto circiter 1.5 cm. longo, lateralibus oblique ovatis terminali aequilongis; stipulae ovatae, 2.5 mm. longae, striatae, pubescentes. *Pedunculi* axillares, biflori, usque ad 0.5 cm. longi; pedicelli 0.4 cm. longi, tenuiter pubescentes. *Calyx* extra glanduloso-puberulus, tubo 4 mm. longo, lobo inferiore lineari-subulato 6 mm. longo, ceteris subaequalibus subulatis 3 mm. longis. *Vexillum* obovatum, 1.8 cm. longum, 1.2 cm. latum, late unguiculatum, basin versus lobulis recurvatis incrassatis instructum; alae oblongae, 1.4 cm. longae, 0.4 cm. latae; carina oblique elliptica, subacuta, 1.5 cm. longa. *Ovarium* 5 mm. longum, pubescens et glandulosum, stylo gracili parte inferiore pubescente. *Legumen* oblongum, 2 cm. longum, breviter pubescens. *Semina* globosa, intense caerulea, nitida, 5 mm. diametro.

SOMALILAND: Buramo, Sō mt., long. 43° 10' E., lat. 10° N., 1,620 m., on gneiss slopes in open wood, climber, 19 Jan., No. 4850 (type in Kew Herb.).

*R. caribaea* DC.—F.T.A. 2: 220; Bak. f. l.c. 474.

SOMALILAND: Elmis, long. 44° 14' E., lat. 10° 22' N., 510–600 m., on mt. slopes in open scrub, fls. yellow, Oct., No. 4502. Vernac.—*Geldabar*.

*R. flavissima* Hochst.—F.T.A. 2: 219; Bak. f. l.c. 475.

SOMALILAND: Debrawen, long. 43° 10' E., lat. 10° 5' N., 990 m., on limestone alluvial, climber, Feb., No. 4942.

*R. Memnonia* DC.—F.T.A. 2: 220; Bak. f. l.c. 473.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., on drier alluvium, fls. yellow, Sept., No. 4043, slopes between Marmar Her and Marmar Gedke Mts., long. 42° 47' E., lat. 10° 29' N., 1,050 m., Nov., No. 4654; Afard, long. 44° 8' E., lat. 10° 10' N., 540 m., in open scrub, Oct., No. 4479. Vernac.—*Jalale*, *Mirzi edalis*.

*R. minima* DC.—F.T.A. 2: 219; Bak. f. l.c. 471.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Oct., No. 4237.

*Rhynchosia Cliffordii* Hutch. et E. A. Bruce, sp. nov. affinis *R. erythraeae* Schweinf. sed caulibus procumbentibus, foliolis latioribus racemis paucifloris differt.

Rami procumbentes, cinereo-tomentelli. *Folia* pinnatim trifoliolata, breviter (ad 1.3 cm.) petiolata, foliolis obovato-rotundatis apice mucronatis vel emarginatis basi rotundatis vel leviter angustatis 1.5–2.5 cm. longis usque ad 3 cm. latis discoloribus supra leviter pubescentibus infra molliter cinereo-tomentosis, nervis lateralibus utrinsecus 3–4; petioluli laterales 2 mm. longi, terminali paulo longiore et basi articulado; stipulae subulato-filiformes, ad 7 mm.

longae. *Racemi* axillares, foliis breviores, 2-3-flori, ubique cinereotomentelli; bracteae stipulas simulantes; pedicelli ad 5 mm. longi. *Calyx* 6 mm. longus, ad medium lobatus, lobis lanceolatis inaequilongis acutis. *Corolla* flava; vexillum obovatum, apice emarginatum, basi breviter unguiculatum et acute auriculatum, 1.2 cm. longum, 0.8 cm. latum, dorso breviter pubescens; alae oblongae, 1 cm. longae, glabrae; carina oblique elliptica, 1 cm. longa. *Ovarium* 3 mm. longum, pubescens; stylus laxe pubescens, stigmatate capitato. *Fructus* oblongus, 1.5-2 cm. longus, molliter et breviter pubescens.

SOMALILAND: Hargeisa, long. 44° E., lat. 9° 35' N., 150 m., on limestone slopes, fls. yellow, 13 Oct., No. 4269 (type in Kew Herb.). Jifa Meidir, long. 43° 15' E., lat. 9° 43' N., 1,650 m., on limestone, prostrate, fls. yellow, 24 Jan., No. 4864.

*Cylista scariosa* Roxb.—Bak. f. l.c. 461.

SOMALILAND: Deriodera, long. 42° 55' E., lat. 10° 3' N., 1,170 m., climber, Nov., No. 4643.

We prefer to follow Baker (Leg. Trop. Afr. p. 461 (1929)) in naming this plant *C. scariosa* Roxb., the material we have seen not being sufficient to decide whether it be different. Three species have been described from Somaliland, authentic specimens of which we have not been able to examine. These are *C. somalorum* Vierh., *C. nogalensis* Chiov. and *C. microphylla* Chiov.

*Erythrina Brucei* Schweinf.—Bak. f. l.c. 369.

ABYSSINIA: Gorla-Kolubi track, long. 41° 45' E., lat. 9° 22' N., 2,520 m., on limestone, tree 20 m. high, fls. scarlet, Mar., No. 5404.

*Vigna nilotica* Hook. f.—Bak. f. l.c. 404.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,140 m., in Buxus scrub, climber, fls. blue and green, Oct., No. 4410.

*V. Schimperii* Baker—F.T.A. 2: 201; Bak. f. l.c. 404.

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 25' N., 210 m., limestone, climber, fls. yellow, Mar., No. 5445.

*V. vexillata* Benth.—F.T.A. 2: 199; Bak. f. l.c. 413.

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 25' N., 2,280 m., on limestone slopes, Mar., No. 5447.

*Dolichos biflorus* Linn.—F.T.A. 2: 210; Bak. f. l.c. 448.

ABYSSINIA: near Kofajalo, long. 41° 51' E., lat. 9° 9' N., 2,130 m., on limestone, fls. yellowish-green, climber, Mar., No. 5273.

*Vicia sativa* Linn. var. *angustifolia* Ser.—Bak. f. l.c. 346.

ABYSSINIA: Gara mulata mt., long. 41° 48' E., lat. 9° 12' N., 2,850 m., in burnt Erica thicket, fls. pink, Mar., No. 5331.

*Stylosanthes flavicans* Bak.—F.T.A. 2: 156; Bak. f. l.c. 320.

SOMALILAND: Barataga, long. 44° 1' E., 10° 5' N., 1,050 m., tree acacia community, fls. yellow spotted with red, Oct., No. 4523.

*Zornia bracteata* (Walt.) Gmel. Syst. 1096. *Z. tetraphylla* Michx.—F.T.A. 2: 159; Bak. f. l.c. 323.

ABYSSINIA: near Fuyan Hunjuba, long. 42° 17' E., lat. 9° 26' N., 2,010 m., bare ground, granite, prostrate herb, Feb., No. 5231.

*Zornia diphylla* (Linn.) Pers.—F.T.A. 2 : 158 ; Bak. f. l.c. 322.  
SOMALILAND : Dobo Pass, long. 43° 15' E., lat. 10° 15' N.,  
1,200 m., on gneiss, in open wood, Feb., No. 4956.

*Desmodium Scalpe* DC.—F.T.A. 2 : 164 ; Bak. f. l.c. 328.

ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 25' N., 3 m. high,  
fls. red, Mar., No. 5416.

*Taverniera glauca* Edgew. in Journ. As. Soc. Beng. 16, 2 : 1214  
(1874).

ADEN : 150 m., on lava, standard yellowish, keel rose, Mar.,  
No. 5519.—Confined to Arabia.

#### HAMAMELIDACEAE.

*Trichocladus malosanus* Baker in Kew Bull. 1897 : 266.

ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 25' N., 2,100 m.,  
in Juniperus-Podocarpus forest, tree 4 m., fls. yellow, Mar., No. 5423.  
Vernac.—*Madissa*.

#### BUXACEAE.

*Buxus Hildebrandtii* Baill.—F.T.A. 6, 1 : 610.

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 900–1,200 m.,  
shrub 3 m., Oct., No. 4377. Vernac.—*Dusogh*.—Also in Abyssinia.

#### MYRICACEAE.

*Myrica salicifolia* Hochst. ex A. Rich.—F.T.A. 6, 2 : 313.

ABYSSINIA : Geldid : long. 41° 48' E., lat. 9° 15' N., 2,430 m.,  
tree 6 m., dioecious, Mar., No. 5382.

#### ULMACEAE.

*Celtis Kraussiana* Bernh.—F.T.A. 6, 2 : 3.

ABYSSINIA : Fujan Hunjuba, long. 42° 17' E., lat. 9° 26' N.,  
1,920 m., tree 10 m., fr. yellow, Feb., No. 5098. Gaфра valley, long.  
42° 13' E., lat. 9° 21' N., 1,500 m., slender tree to 16 m., trunk  
smooth, grey, Feb., No. 5240.

#### BARBEYACEAE.

*Barbeya oleoides* Schweinf.—F.T.A. 6, 2 : 15.

ABYSSINIA : Gobelli valley, long. 41° 59' E., lat. 9° 10' N.,  
1,710 m., tree 4 m., fls. green, Mar., No. 5270. Vernac.—*Garri*.

#### MORACEAE.

*Dorstenia crispa* Engl.—F.T.A. 6, 2 : 73.

SOMALILAND : Jebel Wotni Mt., long. 45° 6' E., lat. 10° 18' N.,  
390 m., fls. greenish yellow, Jan., No. 4802. Boundary Pillar 93,  
long. 45° 9' E., lat. 8° 37' N., 990 m., 10 cm., milky juice, fls.  
greenish, Oct., No. 4223. Vernac.—*Ged ambar*.

*D. foetida* (Forssk.) Schweinf.—F.T.A. 6, 2 : 72.

SOMALILAND : Afard, long. 44° 8' E., lat. 10° 8' N., 1,050 m.,  
leaves dark green, fls. yellow, aromatic, Oct., No. 4464. Vernac.—  
*Ambar*.

*Ficus capensis* Thunb.—F.T.A. 6: 2: 101.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,340 m., tree 10 m., fruits on short branches, edible, Feb., No. 5135. Vernac.—*Harbu*.

*F. glumosa* Del.—F.T.A. 6, 2: 171.

SOMALILAND: Auboba, long. 43° E., lat. 10° 6' N., 1,800 m., shrub 3 m., Nov., No. 4627. Vernac.—*Deer Ad*.

*F. ingens* Miq.—F.T.A. 6, 2: 121.

SOMALILAND: Auboba, 1,800 m., shrub 3 m., Nov., No. 4626. Biju-Suldan, long. 43° E., lat. 10° 20' N., 1,050 m., spreading tree 5 m., Dec., No. 4691. Vernac.—*Deer Ad*, *Lufo*.

*F. populifolia* Vahl—F.T.A. 6, 2: 189.

SOMALILAND: Bir Dai, long. 44° 17' E., lat. 9° 55' N., 900 m., tree 8 m., Oct., No. 4335. Vernac.—*Nidir*. *Hamash*.

*F. salicifolia* Vahl—F.T.A. 6, 2: 115.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,440 m., tree 3 m., Sept., No. 4052. Vernac.—*De-er*.

*F. Sycomorus* Linn.—F.T.A. 6, 2: 95.

SOMALILAND: Camp 4, long. 44° 16' E., lat. 10° N., 900 m., tree 10 m., fruit on branches remote from leaves, Oct., No. 4354. Vernac. *Dare*.

*F. Thonningii* Blume—F.T.A. 6, 2: 187.

ABYSSINIA: Hara, long. 42° 10' E., lat. 9° 20' N., 1,620 m., tree 4 m., Feb., No. 5061. Vernac.—*Shorla*.

*F. vasta* Forssk.—F.T.A. 6, 2: 194.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,200 m., tree 8 m., fragrant in hot sun, fruit edible, Oct., No. 4417. Deriodera, long. 42° 55' E., lat. 10° 3' N., 1,170 m., tree 20 m., Nov., No. 4639. Vernac.—*Berde*.

#### URTICACEAE.

*Urera hypselodendron* Wedd.—F.T.A. 6, 2: 255.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,460 m., climbing, fls. red, Feb., No. 5144.

*Debregeasia salicifolia* Rendle—F.T.A. 6, 2: 295.

ABYSSINIA: Geldid, long. 41° 48' E., lat. 9° 15' N., 2,280 m., shrub 4 m., fls. pinkish, Mar., No. 5393.—Occurs eastwards as far as the Western Himalayas.

*Forskohlea viridis* Ehrenb. ex Desf.—F.T.A. 6, 2: 302.

SOMALILAND: Wobleh Mt., long. 43° 17' E., lat. 10° 15' N., 1,200 m., fls. yellowish, smells like mignonette, Nov., No. 4594. Aden, 150 m., annual, stems red, fls. green, Mar., No. 5517.

#### CELASTRACEAE.

*Gymnosporia arbutifolia* (Hochst.) Loes. in Engl. Bot. Jahrb. 17: 547 (1893). *Celastrus arbutifolius* Hochst.—F.T.A. 1: 363.

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 25' N., 2,100 m., on limestone slopes, in lower Juniperus-Podocarpus forest, bushy tree 5 m., fls. cream, Mar., No. 5444. Vernac.—*Kombolcha*.—Also in Eritrea.

*G. buxifolia* (Linn.) Szyszyl. Pl. Rehmann. 2 : 34 (1888).

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,340 m., in remnants of Podocarpus forest, spreading tree to 7 m., fls. cream, Feb., No. 5131. Vernac.—*Kombolcha*.

*G. luteola* (Del.) Szyszyl. Pl. Rehmann. 2 : 34 (1888). *Celastrus luteolus* Del.—F.T.A. 1 : 363.

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 1,110–1,260 m., common in Buxus scrub, shrub 3 m., fls. white, Oct., No. 4419. Libah Mele Range, long. 43° E., lat. 10° 20' N., 1,590–1,710 m., on schist rocks with *Juniperus*, shrub 4 m., fls. cream, Dec., No. 4684.

ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,550 m., on limestone in evergreen forest, 6 m., fls. cream, Mar., No. 5352. Vernac.—*Sarad* ; *Deg wun* (Somali).

*G. senegalensis* (Lam.) Loes. in Engl. Bot. Jahrb. 17 : 541 (1893) ; F.W.T.A. 1 : 445, fig. 158. *Celastrus senegalensis* Lam.—F.T.A. 1 : 361.

SOMALILAND : Biju Suldán, long. 43° E., lat. 10° 20' N., on rocks with *Buxus*, *Ficus*, *Cordia*, shrub 4 m., fls. cream, Dec., No. 4692. Vernac.—*Jaad*.

*G. serrata* (Hochst.) Loes. in Engl. Bot. Jahrb. 41 : 302 (1908). *Celastrus serratus* Hochst.—F.T.A. 1 : 362.

SOMALILAND : Mt. Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,530 m., in evergreen scrub-Juniper forest, shrub 3 m., fls. cream, Feb., No. 4985. Vernac.—*Dubobeis*.—Also in Abyssinia.

#### ICACINACEAE.

*Trematosperma cordatum* Urb. in Ber. Deutsch. Bot. Ges. 1 : 182 (1883).

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 1,200–1,260 m., on edge of Buxus scrub on southern, dry side of the ridge, spherical white stem up to 1 m. in diameter, Oct., No. 4420. Vernac.—*Adalis ad*.—Endemic.

#### SALVADORACEAE.

*Azima tetracantha* Lam.—F.T.A. 4, 1 : 22.

SOMALILAND : Simodi, long. 43° 30' E., lat. 10° 5' N., 1,200–1,740 m., shrub 1 m., Nov., No. 4578.

*Dobera glabra* A.DC. in DC. Prod. 17 : 31 (1873). *D. Roxburghii* Planch.—F.T.A. 4, 1 : 21.

SOMALILAND : Jalelo, long. 44° 14' E., lat. 9° 45' N., 1,080 m., shrub 5 m., fls. white, fruit edible, Oct., No. 4301. Vernac.—*Garas*.

*Salvadora persica* Linn.—F.T.A. 4, 1 : 23.

SOMALILAND : Jalelo, shrub 5 m., fresh twigs used for tooth-brushes, Oct., No. 4300. Aden : 150 m., tree 3–4 m., fls. green, berries red, Mar., No. 5506. Vernac.—*Adi* (Somali) ; *Ruk* (Aden).



## OLACACEAE.

*Ximenia americana* Linn.—F.T.A. 1: 346; F.W.T.A. 1: 458.

ABYSSINIA: Gafra Valley, long.  $42^{\circ} 13'$  E., lat.  $9^{\circ} 21'$  N., 1,500 m., in *Acacia* scrub, bush 4 m., fls. greenish cream, Feb., No. 5243. Vernac.—*Unkwoi*.

## OPILIACEAE.

*Opilia strobilifera* Hutch. et E. A. Bruce, sp. nov. affinis *O. celtidifoliae* Endl., sed foliis anguste oblanceolatis ad obovato-ellipticis haud acuminatis differt.

Frutex ad 2 m. altus; rami vetustiores fere 1 cm. crassi, hornotini cinereo-virides, puberuli. *Folia* breviter petiolata, anguste oblanceolata ad obovato-elliptica, apice obtusa vel rotundata, interdum emarginata, basi subacuta et 3-5-nervia, 2.5-3.5 cm. longa, 0.6-2 cm. lata, crassa, puberula. *Inflorescentiae* alabastro strobiliformes, plerumque in ramis vetustioribus congestae; bractae late triangulari-ovatae, ciliatae; pedicelli 2 mm. longi, minute puberuli. *Calyx* annularis, carnosus, minute puberulus. *Petala* flava, 5, ovato-elliptica, subacuta, 2 mm. longa. *Stamina* 5, filamentis 1 mm. longis. *Disci glandulae* 5, magnae, ovoideae, inflexae. *Ovarium* ellipsoideum, glabrum, stylo perbrevis crasso.

SOMALILAND: Daba Bur, long.  $42^{\circ} 54'$  E., lat.  $10^{\circ} 9'$  N., 1,500 m., on steep limestone slope, shrub 2 m., fls. cream, 22 Nov., No. 4636 (type in Kew Herb.). Buramo, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ}$  N., 1,080-1,410 m., stony slopes in *Acacia* open wood, shrub 2 m., leaves glaucous, fls. yellow, inconspicuous, 27 Jan., No. 4868. Vernac.—*Eri*.

## LORANTHACEAE.

*Loranthus Acaciae* Zucc.—F.T.A. 6, 1: 280.

SOMALILAND: Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,290 m., fls. flame red, Sept., No. 3945. Vernac.—*Dilo yahan*.

*L. curviflorus* Benth. ex Oliv.—F.T.A. 6, 1: 279.

SOMALILAND: Dara weina, long.  $44^{\circ} 80'$  E., lat.  $9^{\circ} 48'$  N., 1,110 m., fls. scarlet, Oct., No. 4286. Afard, long.  $44^{\circ} 8'$  E., lat.  $10^{\circ} 10'$  N., 540 m., fls. red, Oct., No. 4456. Vernac.—*Dilo yahan*.

*L. Dregei* Eckl. et Zeyh. var. *kerenicus* Sprague—F.T.A. 6, 1: 312.

SOMALILAND: Wobleh, long.  $43^{\circ} 17'$  E., lat.  $10^{\circ} 15'$  N., 1,590 m., Nov., No. 4593. Auboba, long.  $43^{\circ}$  E., lat.  $10^{\circ} 6'$  N., 1,800 m., fls. pink and green, Nov., No. 4625. Vernac.—*Dilo yahan*.

*L. dschallensis* Engl.—F.T.A. 6, 1: 286.

SOMALILAND: Buramo-Warieto tug, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ} 2'$  N., 1,050 m., on *Acacia*, fls. dull yellow, Jan., No. 4906. Vernac.—*Dilo yahan*.

*L. Fischeri* Engl.—F.T.A. 6, 1: 331.

SOMALILAND: Hargeisa, long.  $44^{\circ} 3'$  E., lat.  $9^{\circ} 33'$  N., 1,260 m., fls. red, Sept., No. 4064. Vernac.—*Dilo yahan*.

*L. Kelleri* Engl.—F.T.A. 6, 1: 337.

SOMALILAND: Boundary, long. 47° 10' E., lat. 8° 57' N., 1,260 m., corolla tube dark purple red, lobes red and yellow, Sept., No. 4077. Hargeisa, 1,350 m., fls. green below, red above, Oct., No. 4226. Vernac.—*Dilo yahan*.—Endemic.

*L. nummulariifolius* Franch.—F.T.A. 6, 1: 281.

SOMALILAND: Auboba, long. 43° E., lat. 10° 6' N., 1,740 m., fls. red, Nov., No. 4629. Vernac.—*Dilo yahan*.—Endemic.

*L. panganensis* Engl.—F.T.A. 6, 1: 316.

SOMALILAND: Marmar range, long. 42° 42' E., lat. 10° 32' N., 1,110 m., leaves soft and succulent, fls. red and orange, Nov., No. 4663. Vernac.—*Dilo yahan*.

*Loranthus sarertaensis* Hutch. et E. A. Bruce, (§ *Lepidoti*) sp. nov. affinis *L. erythraeo* Sprague et *L. usuiensi* Oliv. ab ambobus corolla fere glabra differt.

Ramuli hornotini brevissime pubescentes, circiter 4 mm. crassi, vetustiores 1.3 cm. crassi, purpurascentes, puberuli. *Folia* anguste ovata vel late lanceolata, apice et basi rotundata, 10–12 cm. longa, 4–6 cm. lata, sicco utrinque crebre verrucosa, nervis lateralibus utrinque indistinctis circiter 3–4-jugis; petioli 1.5 cm. longi. *Fasciculi* pluriflori; pedicelli 2 mm. longi, crassi, pubescentes; bractea cymbiformis, 3 mm. longa, utrinque stellato-tomentosa. *Receptaculum* 2.5 mm. longum, breviter pubescens. *Calyx* cupularis, 1.25 mm. longus, brevissime denticulatus, extra et margine breviter pubescens. *Corolla* 6 cm. longa, extra glabra vel fere glabra, lobis lineari-spatulatis 1.4 cm. longis subacutis. *Filamenta* fere 1 cm. longa; antherae 3 mm. longae, loculis 4 vertice dispositis; stylus glaber, circiter 5.5 cm. longus, superne angulatus; stigma ovoideum.

ABYSSINIA: Slopes of Sarerta Mt., long. 42° 19' E., lat. 9° 20' N., 2,400 m., fls. orange, 23 Feb., No. 5194 (type in Kew Herb.).

*L. Schimperii* Hochst. ex A. Rich.—F.T.A. 6, 1: 337.

SOMALILAND: Camp 4, long. 44° 16' E., lat. 10° N., 900 m., fls. yellow, Oct., No. 4353.

var. *parviflorus* Hutch. et E. A. Bruce, var. nov., a typo corollis dimidio brevioribus differt.

SOMALILAND: Hargeisa, 1,260 m., fls. yellow, Sept., No. 3947. Hargeisa, 1,380 m., fls. orange, Oct., No. 4277. Simodi, long. 43° 30' E., lat. 10° 5' N., 1,350 m., fls. yellow, fr. orange-red, Nov., No. 4568.

ABYSSINIA: Harar-Kofajalo Road, long. 41° 55' E., lat. 9° 9' N., 360 m., fls. yellow, Mar., No. 5271. Vernac.—*Dilo yahan*.

*L. Thomsonii* Sprague—F.T.A. 6, 1: 276.

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., fls. red, Oct., No. 4167. Vernac.—*Dilo yahan*.—Endemic.

*L. ugogensis* Engl.—F.T.A. 6, 1: 336.

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 25' N., 2,130 m., fls. red-yellow, Mar., No. 5449.

*Viscum nervosum* Hochst. ex A. Rich.—F.T.A. 6, 1 : 397.

ABYSSINIA : Fuyan Hunjuba, long.  $42^{\circ} 17' E.$ , lat.  $9^{\circ} 26' N.$ , 1,920 m., fls. cream minute, Feb., No. 5097. Vernac.—*Mutukonia*.

*V. Schimperii* Engl.—F.T.A. 6, 1 : 407.

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., fls. yellow, Sept., No. 3946. Vernac.—*Dilo yahan*.

*V. tuberculatum* A. Rich.—F.T.A. 6, 1 : 396.

SOMALILAND : Libah Hele Mts., long.  $43^{\circ} E.$ , lat.  $10^{\circ} 20' N.$ , fls. yellow, ripe fruits red, Dec., No. 4696. Vernac.—*Dilo yahan*.

#### SANTALACEAE.

*Osyridicarpus Schimperianus* A.DC.—F.T.A. 6, 1 : 432.

ABYSSINIA : Harar, long.  $42^{\circ} 10' E.$ , lat.  $9^{\circ} 20' N.$ , 1,620 m., on granite, in hedges and evergreen scrub, weak ascending shrub, fls. greenish yellow, Feb., No. 5056.

*Osyris compressa* (Berg.) A.DC. in DC. Prod. 14 : 634 (1857).

*Osyris abyssinica* Hochst.—F.T.A. 6, 1 : 433.

SOMALILAND : Simodi, long.  $43^{\circ} 30' E.$ , lat.  $10^{\circ} 5' N.$ , 1,740 m., on open slopes of mt. top, shrub 1 m. high, fls. yellowish, Nov., No. 4581.

ABYSSINIA : Harar, 1,920 m., on limestone, Feb., No. 5011. Vernac.—*Asäso*.

*Thesium radicans* Hochst. ex A. Rich.—F.T.A. 6, 1 : 415.

SOMALILAND : Boundary 7 miles W. of long.  $44^{\circ} E.$ , lat.  $9^{\circ} N.$ , 1,350 m., on grass roots, fls. white, Oct., No. 4230.

*T. Schweinfurthii* Engl.—F.T.A. 6, 1 : 416.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48' E.$ , lat.  $9^{\circ} 12' N.$ , 2,790 m., open grass, fls. white, Mar., No. 5333.

#### RHAMNACEAE.

*Sageretia spiciflora* (A. Rich.) Chiov. in Ann. di Bot. 10 : 444, in obs. (1912).

SOMALILAND : Mt. Wobleh, long.  $43^{\circ} 17' E.$ , lat.  $10^{\circ} 15' N.$ , 1,740 m., on mt. top with *Juniperus procera*, shrub 2 m., fls. cream, Nov., No. 4592. Abyssinia : Gobelli, long.  $41^{\circ} 59' E.$ , lat.  $9^{\circ} 10' N.$ , 1,590 m., in evergreen scrub on granite slopes, fls. yellowish, 3 m., Mar., No. 5266. Vernac.—*Gutamē* (Abyss.).—Also in Eritrea and Arabia.

*Berchemia discolor* Hemsl.—F.T.A. 1 : 381.

SOMALILAND : Daraweina, No. 4283.

*Helinus mystacinus* (Ait.) E. Mey.—F.T.A. 1 : 385.

SOMALILAND : Jifa Uri, long.  $43^{\circ} 22' E.$ , lat.  $9^{\circ} 42' N.$ , 1,680 m., evergreen scrub or gneiss kopje, climber, fls. white, Jan., No. 4835. Buramo, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} 2' N.$ , 1,170 m., in gneiss ravine, Jan., No. 4902.

ABYSSINIA : near Fuyan Hunjuba, long.  $42^{\circ} 17' E.$ , lat.  $9^{\circ} 26' N.$ , 1,950 m., Feb., No. 5232.

*Rhamnus prinoides* L'Hérit.—F.T.A. 1: 382.

ABYSSINIA: Fuyan Hunjuba, long. 42° 17' E., lat. 9° 26' N., 1,920 m., on granite, fls. green, fr. dark red, Feb., No. 5102. Vernac.—*Gesho*.

R. *Staddo* A. Rich.—F.T.A. 1: 382. R. infusionum *Del. ex Ferr. & Galin*.

SOMALILAND: Mt. Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,290 m., in open wood evergreen scrub, shrub 2 m., fls. greenish cream, Feb., No. 4979.

ABYSSINIA: Slopes of Sarerta Mt., long. 42° 19' E., lat. 9° 30' N., 2,400 m., in forest on limestone, bushy tree 4 m., fls. greenish yellow, Feb., No. 5180; 5181. Vernacs.—*Jajale* (Somali), *Gadida* (Abyss.)—Also in Eritrea.

*Ziziphus Hamur* Engl. in Ann. Ist. Bot. Rom. 7: 19 (1897).

SOMALILAND: Afard, long. 44° 8' E., lat. 10° 10' N., 510 m., shrub 4 m., fls. cream, Oct., No. 4481. Vernac.—*Hamud*.—Endemic.

*Z. mauritiana* Lam. Encycl. Meth. 3: 319 (1789). *Z. jujuba* Lam.—F.T.A. 1: 379; F.W.T.A. 1: 471, not of *Mill*.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,320 m., fairly frequent tree 12 m. high, Sept., No. 3900. Vernac.—*Gob*.

*Z. mucronata* Willd.—F.T.A. 1: 380; F.W.T.A. 1: 470.

SOMALILAND: Hargeisa, long. 44° E., lat. 9° 35' N., 1,380 m., on sandstone rocks, tree 4 m., Oct., No. 4258. Vernac.—*Gob yer*.

#### AMPELIDACEAE.

*Cissus adenocaulis* Steud. ex A. Rich. Fl. Abyss. 1: III (1847); F.W.T.A. 1: 477.

ABYSSINIA: Harar, long. 42° 10' E., lat. 9° 20' N., 1,650 m., in evergreen scrub, fls. yellow tipped with red, Feb., No. 5049.

*C. cyphopetala* Fresen. in Mus. Senckenberg 2: 282 (1837-45).

ABYSSINIA: Boesesa valley, long. 42° 18' E., lat. 9° 29' N., 2,100 m., on limestone, on margin of evergreen forest, fls. cream, 2,100 m., Feb., No. 5175.

*C. jatrophoides* (Welw.) Planch. in DC. Monog. Phan. 5: 579 (1887).

ABYSSINIA: near Mulkajibri, long. 42° 16' E., lat. 9° 24' N., 1,800 m., erect herb full of sap, 0.6 m. high, fls. cream, Feb., No. 5234. Vernac.—*Mido Korbo*.

*C. nivea* Hochst. ex Schweinf. Beitr. Fl. Aethiop. 83 (1867).

ABYSSINIA: Kofa jalo, long. 41° 51' E., lat. 9° 9' N., 2,250 m., in *Juniperus* forest, climber, Mar., No. 5276.—Also in Eritrea.

*C. quadrangularis* Linn. Mant. 39 (1767); F.W.T.A. 1: 475.

SOMALILAND: Biji, long. 44° 5' E., lat. 10° 12' N., 420 m., on sandy plains, Oct., No. 4511. Vernac.—*Gaad*.

*C. rotundifolia* (Forssk.) Vahl Symb. Bot. 3: 19 (1790).

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Oct., No. 3949. Vernac.—*Armo*.

*C. Schimperii* Hochst. ex A. Rich. Fl. Abyss. 1: 114 (1847).

ABYSSINIA: Harar, No. 5049.—Endemic.

*C. Schweinfurthii* Planch. in DC. Monog. Phan. 5 : 591 (1887).

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 1,200 m., in *Buxus* scrub, fls. greenish yellow, Oct., No. 4422. Vernac.—*Armo Goria*.

*C. serpens* Hochst. ex A. Rich. Fl. Abyss. 1 : 111 (1847).

SOMALILAND : Boundary, long. 44° 15' E., lat. 8° 58' N., 1,260 m., amongst *Acacia*, fls. yellow, Sept., No. 4141. Vernac.—*Armo malehle* or *gorie*.

*Rhoicissus erythroides* (Fresen.) Planch. in DC. Monog. Phan. 5 : 465 (1887).

ABYSSINIA : Harar-Gobelli Road, long. 42° 6' E., lat. 9° 17' N., 1,890 m., on granite in lower evergreen formation, fls. yellow with red tips, Mar., No. 5252.

*R. Revoilii* Planch. in DC. Monog. Phan. 5 : 469 (1887).

SOMALILAND : Libah Hele, Birda, long. 43° E., lat. 10° 20' N., 1,620–1,670 m., on limestone in *Buxus* scrub, fls. chocolate, Nov., No. 4677. Vernac.—*Armo saged*.

#### RUTACEAE.

*Fagara chalybea* Engl. Pflanzenfam. 3, 4 : 118 (1890).

SOMALILAND : Libah Hele Mt., long. 43° E., lat. 10° 20' N., 1,560 m., on limestone in *Buxus-Juniperus* scrub, shrub 4 m., Dec., No. 4695. Vernac.—*Meeh Godleh*.

*F. usambarensis* Engl. in Notizblatt. Bot. Gart. Berl. 3 : 84 (1900).

ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 27' N., 1,980 m., on limestone slopes, in evergreen scrub, 3–4 m., fr. Mar., No. 5451.

*Fagaropsis Gillettii* Chiov., sp. nov. affinis *F. Hildebrandtii* (Engler) Milne-Redhead quae differt praecipue baccis bilobis bilocularibus ; fructibus sphaericis appropinquatur *F. angolensi* (Engler sub *Clausenopsi*) Chiov., comb. nov. quae arbor procera foliis 3–4-jugis multo majoribus, baccis 2–3-plo majoribus.

Frutex circ. 2 m. altus, ramis oppositis angulo semirecto divaricatis cylindraceis cicatricosis cortice cinereo-fusco tectis, lenticellis leviter prominentibus subrotundis cortice concoloribus rima longitudinali praeditis sparsis, junioribus adpresse hirtellis ; macroblasti internodiis 5–15 mm. longis, brachyblasti turulosi 5–15 mm. longi, 2 mm. circ. crassi. *Folia* opposita, imparipinnata 2-juga, rarius unijuga ; petiolus 7–15 mm. longus, gracilis, supra planus, 0.5 mm. latus, subtus teres, minute et sparse puberulus ; rachis inter juga petiolo omnino similis 6–11 mm. longa ; foliola chartacea sicco pallide virentia, in limbo parce diaphano-punctata, in oris integris leviter deflexis glandulis permagnis tumidis translucidis numerosis densis leviter venulata ; foliolum terminale sessile vel raro petiolulo 3–5 mm. longo suffultum, coeteris majus obovatum 17–32 mm. longum 11–15 mm. latum basin versus e  $\frac{1}{2}$  vel  $\frac{2}{3}$  superiore parte sensim lineis rectis vel paullum concavis attenuatum, apice plerumque breviter angustatum, summitate obtusum, interdum plus

minusve rotundatum, raro utrisque extremitatibus subaequaliter breviter contractum; lateralibus oblique ovata vel ovato-lanceolata, jugi superioris majora 11–23 mm. longa 4–10 mm. lata; inferioris 5–15 mm. longa 3–8 mm. lata, latere anteriore angustiore inferne cuneato, posteriore latiore basi rotundato; superficies utraeque glabrae, sed costa subtus valde prominens adpresse puberula, nervis utrinque 5–6 subtus leviter prominulis, venis omnino obsoletis. *Inflorescentiae* foliorum dimidiam partem aequantes, in brachyblastis sessiles vel pedunculo 3 mm. longo, ramis oppositis tetragonis; bracteae ovatae, 1.5–2 mm. longae, 0.5–1 mm. latae, puberulae; pedicelli fructiferi 6–8 mm. longi, tetragoni, puberuli. *Baccae* globosae, rubrae, 6–7 mm. diam. magnae, scrobiculato-punctatae, endocarpio membranaceo albido, 3–4-loculares. *Semina* 4–5, valde compressa, subrotunda vel ellipsoidea, 2.5–3 mm. longa, 2.5 mm. lata, 1.2 mm. spissa, testa coriacea ochroleuca vel flava.

SOMALILAND: on calcareous rocks with *Olea*, *Dodonaea viscosa*, *Acokanthera Schimperii*, at Buramo, 1,500 m., long. 43° 10' E., lat. 10° N., 16.1.1933, Gillett n. 4844 (type in Kew and Bologna Herb.).

*Teclea nobilis* Del. in Ann. Sci. Nat. Ser. 2, 20: 90 (1843). *Toddalia nobilis* Hook. f.—F.T.A. 1: 306.

SOMALILAND: Afard, long. 44° 8' E., lat. 10° 8' N., 1,170 m., in *Buxus* scrub, shrub 3 m., fls. yellow, fragrant, Oct., No. 4467.

ABYSSINIA: Galla Pass, long. 47° 19' E., lat. 9° 28' N., 2,340 m., scrub to *Podocarpus* forest, 3 m., fls. cream, Feb., No. 5136. Vernac.—*Buro* (Somali).

*T. pilosa* (Engl.) Verdoorn in Kew Bull. 1926: 407.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,140 m., in *Buxus* scrub, shrub 3 m., fls. greenish yellow, aromatic; Oct., No. 4407. Vernac.—*Bara gurun*.

*Toddalia asiatica* Lamk. Illustr. 2: 116 (1793).

ABYSSINIA: slopes of Sarerta Mt., long. 42° 19' E., lat. 9° 30' N., about 2,400 m., in evergreen forest, 4 m., fls. cream, Feb., No. 5182. Vernac.—*Gumuro*.

#### SIMARUBACEAE.

*Balanites aegyptiaca* Del.—F.T.A. 1: 315; F.W.T.A. 1: 484.

SOMALILAND: Dara weina, long. 44° 8' E., lat. 9° 40' N., up to 1,230 m., on sand, in *Acacia-Aloe* community, tree 5 m., fls. greenish-yellow, Oct., No. 4284. Vernac.—*Got*.

*B. glabra* Mildbr. & Schlecht. in Engl. Bot. Jahrb. 51: 163 (1913).

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., among *Acacia* and *Aloe*, tree 3–5 m., fls. greenish, Sept., No. 3941.

ABYSSINIA: Gobelli, long. 41° 59' E., lat. 9° 10' N., 1,380 m., on granite in *Acacia* open wood, tree 5 m., ripe fruit orange, fls. green, Mar., No. 5262. Vernac.—*Kidi* (Somali).

*B. orbicularis* Sprague in Kew Bull. 1908: 57.

SOMALILAND: Afard, long. 44° 8' E., lat. 10° 10' N., 510 m., in deep sand at mountain foot, tree 6 m., fls. green, Oct., No. 4431. Vernac.—*Kulan*.—Also in Uganda.

*Brucea antidysenterica* Mill.—F.T.A. 1 : 309 ; F.W.T.A. 1 : 486.  
ABYSSINIA : Mulkajibri, long. 42° 16' E., lat. 9° 24' N., 1,650 m.,  
on granite, shrub 3 m., fls. brownish green, fr. red, Feb., No. 5083.  
Vernac.—*Hadawi*.

BURSERACEAE.

*Boswellia Bricchettii* (Chiov.) Chiov., comb. nov. *Commiphora*  
*Bricchettii* Chiov. Fl. Somala 2 : 58 (1932).

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N.,  
990 m., shrub 3 m., fls. white, Oct., No. 4211. Vernac.—*Ged*  
*Fogr*.—Endemic.

*B. Carteri* Birdw. in Trans. Linn. Soc. 27 : 143 (1870).

SOMALILAND : Marmar Gedke range, long. 42° 42' E., lat. 10°  
32' N., on limestone rocks, tree 4 m., Nov., No. 4662. Vernac.—*Medi*.—Also in Arabia.

*Commiphora africana* Engl. in DC. Monog. Phan. 4 : 14 (1883).

SOMALILAND : Hargeisa, long. 42° 2' E., lat. 9° 34' N., 1,290 m.,  
sandy soil among *Aloes*, shrub 2 m., Oct., No. 4278. Rarele Mt.,  
long. 43° 15' E., lat. 10° N., 1,800 m., tree 5 m., Dec., No. 4734.  
Vernac.—*Disin Kakabi*.

*C. ancistrophora* Chiov. Fl. Somala 2 : 111 (1932).

SOMALILAND : Afard, long. 44° 39' E., lat. 8° 47' N., 1,140 m.,  
shrub 1 m., leaves greyish, Oct., No. 4144. Boundary Pillar 93,  
shrub 2 m., very aromatic, Oct., No. 4203. Vernac.—*Alioi eh aliboy*.  
*Daseno*. *Garon*.—Endemic.

*Commiphora Anglosomaliae* Chiov. sp. nov., incertae sedis, nullis  
speciebus notis stricte referenda.

Rami elongati virgati 3–4 mm. spissi, internodiis 1–3 cm. longis,  
hornotinis cortice cinereo leviter plicato-succulento glabro opaco  
tectis, lenticellis sparsis parum manifestis et elevatis minutis rotundis  
vel transverse ellipticis 0.5 mm. latis vel 0.6 mm. longis, fissura  
transversa ; brachyblasti 2–23 mm. longi 3 mm. diam., crassi,  
creberrime annulati corrugati, apice squamis minutis triangularibus  
1.5 mm. longis et fere latis subcoriaceis nitidulis brunneo-rufescen-  
tibus praediti, interdum in spinam 5–10 mm. longam conicam  
abeuntes quandoque alternatim dispositi ramulos anfractos spinosos  
formantes. *Folia* in specimine desunt. *Flores* 3–5 fasciculati in  
brachyblastis ; pedicelli 0.5–1 mm. longi, tenues, glabri. *Calyx*  
1.5 mm. longus, tubo obtuse tetragono 1.25 mm. diam. lato, apice  
dentibus 4 ovato-triangularibus 0.5 mm. longis 0.7 mm. latis, apice  
obtusis ut tubus totus fusco coloratis, oris angustissime albo-  
marginatis. *Petala* sicco purpurea, linearia, 6 mm. longa, 0.6–0.7  
mm. lata, apice rotundata, basi e medio sensim angustata, stricte  
appropinquata, apicibus curvato-divergentibus. *Stamina* cum  
antherarum apicibus 1 mm. sub petalorum summitates attingentia.

SOMALILAND : Auboba, long. 43° E., lat. 10° 1' N., 1,590 m.,  
shrub 2 m., fls. wine red tipped with dark green, 21 Nov., No. 4632  
(type in Kew Herb.). Vernac.—*Hagar medu*.

*Commiphora Bruceae* Chiov. sp. nov. (§*Glabra*, *Integrifoliolata*).

Frutex ramosissimus undique glaberrimus, ramis adultis cortice plicato-anguloso violaceo-fusco, leviter cineraceo, elenticelloso; macroblasti spinosi, 1.5–6 mm. longi, fere angulo recto patentes; brachyblasti 1–2 mm. longi, folia fasciculata 3–5 et flores 1–3 fasciculatos gerentes. *Folia* omnia simplicia, glabra; petiolus 1 mm. longus, supra planus vel junior leviter sulcatus; laminae subcoriaceae, lineari-lanceolatae, 10–15 mm. longae, prope basin rotundatae vel breviter cuneatae, 2–3 mm. latae, marginibus subparallelis e  $\frac{1}{4}$  vel  $\frac{1}{5}$  suprema parte angustatae, apice acutae vel obtusiusculae, utrinque glaberrimae, sicco pallide virides subconcolores; margines integerrimi, plani vel leviter undulati, concolores, non incrassati; costa subtus valde elevata, subaurantiaca, supra plana vel vix elevata; nervi utrinque 5–6 filiformes subtilissimi, subtus colore obscuro vix manifesti, supra omnino evanidi. *Flores* minimi; pedicellus 0.2–0.5 mm. longus. *Calyx* cupulatus, 1 mm. longus, obtuse tetragonus, dentibus 4 ovatis obtusiusculis  $\frac{3}{4}$  vel  $\frac{1}{4}$  calycis aequantibus, apice obtusiusculis, sinu rotundato separatis. *Petala* 4, anguste linearia, 4–5 mm. longa, 0.6 mm. lata, marginibus parallelis, apice obtusa, leviter cucullato-emarginulata.

Speciminis fructiferi folia angusta elliptico-oblonga vel elliptico-lanceolata 3–4.5 cm. longa, marginibus subparallelis, 4–6 mm. lata, apice attenuato-acuta vel rotundato-obtusissima, basi anguste rotundata vel breviter cuneata. Bacca ovoidea, 10–12 mm. longa, 8–9 mm. lata, apice apiculata; nucleus compressus, orbicularis, 5–6 mm. longus et latus, 3–3.5 mm. spissus, 2-locularis, loculis aequalibus monospermis. Pseudoarillus non visus; exocarpium valde succoso-resinosum, flavescens.

SOMALILAND: Boundary, long. 44° 15' E., lat. 8° 58' N., 1,260 m., shrub 2 m., fls. dull yellow, 30 Sept., No. 4102 (type in Kew Herb.).

SOMALILAND: Jalelo, long. 44° 14' E., lat. 9° 45' N., 1,080 m., shrub 1 m., 16 Oct., No. 4291. Vernac.—*Goah*.

*C. candidula* Sprague in Hook. Ic. Pl. t. 3106 (1927).

SOMALILAND: Boundary, long. 44° 15' E., lat. 8° 57' N., 1,260 m., in shallow soil, shrub 2 m., stem with milky juice, leaves aromatic, much grazed, Sept., No. 4099. Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., fls. green, Oct., No. 4164. Vernac.—*Go-ah*; *Rahan-reb*.

*C. crassispina* Sprague l.c. t. 3107.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 840–990 m., open scrub, shrub 3 m., leaves glossy, Oct., No. 4386. Vernac.—*Domod*.

*Commiphora crenato-lobata* Chiov. sp. nov. (§*Pilosa*, *Serratifoliolata*).

Frutex videtur inermis vel subspinosus, ramis vetustis cortice cinereo in violaceum vergente, serius longitudinaliter fissurato; brachyblasti 2–5 mm. longi, 2–5 mm. spissi. *Folia* in brachyblastis 3–5 fasciculata, omnia 3-foliolata, foliolis sessilibus valde inaequalibus; petiolus gracilis, 2–6 mm. longus, pilis minutis densiusculis



patentibus cinereo-pubescentibus; foliolum medium obovatum, 10-12 mm. longum, 10-18 mm. latum, apice rotundatum, vel saepe plus minusve profunde trilobatum, e  $\frac{1}{2}$  vel  $\frac{1}{3}$  superiore basin versus sensim cuneato-angustatum; supra sicco pallide viride, pilis brevissimis patentibus sparsum, subtus subalbicans in nervis et venis similibus densiuscule indutum; costa et nervi duo inferiores circ.  $\frac{1}{3}$  inferiore inserti, caeteris crassiores et 2-3 superiores graciliores supra subtusque flavescentes, supra explanati subtus prominuli; venae eleganter reticulatae, colore fusco manifestae, explanatae; margines antici plus minusve manifeste trilobulati et grosse crenato-dentati, dentibus rotundatis circ. 2 mm. latis 0.5-1 mm. longis. *Foliola* lateralia inaequilateraliter subrotunda, 2-5 mm. longa et lata, crenis 2-4 incisa ut medianum colore, trichomate et nervositate insignita. Specimina tantum foliosa.

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., bush 3 m., fls. reddish, 5 Oct., No. 4155 (type in Kew Herb.). Vernac.—*Mogoleh*.

*C. crenulata* (A. Terracc.) Chiov. Fl. Somalia 2: 75, fig. 40 (1932)—(fide Chiov.).

SOMALILAND: Boundary Pillar 93, 990 m., shrub 2 m., leaves glaucous, 6 Oct., No. 4184. Vernac.—*Mala wa hared*.—Endemic.

*Commiphora cuspidata* Chiov. sp. nov. *C. Playfairii* var. benadirensis Chiov. Fl. Somalia ii. 70 fig. 36 (1932); videtur species intermedia inter *C. rostratam* Engl. et *C. Playfairii* (Hook. f.) Engl., primam accedit ob fructum, secundam ob foliorum compositionem.

Frutex intricato-ramosus, ramis robustis rigidis vetustis cortice plicato-succulento cinereo, macroblastis spinosis 1-7 cm. longis conicis basi 4 mm. diam. circ. crassis, brachyblastis 1.5-2 mm. longis usque 2.5 mm. latis, squamulosis. *Folia* 3-6-fasciculata omnino glabra, trifoliolata; petiolus gracilis, 3-4 mm. longus, 0.3 mm. latus, supra planus, subtus semiteres; foliola sessilia, tenuiter chartacea, sicco cinereo-viridia, supra paulo intensius viridia; foliolum medium obovatum, 1-3 mm. longum, 0.5-1.5 mm. latum, apice rotundatum vel leviter contractum, basi e  $\frac{1}{3}$  vel  $\frac{1}{4}$  superiore parte sensim cuneato-attenuatum; margines integerrimi, plani; costa utrinque subconcolor, subtus parum elevata, supra explanata; nervi utrinque 3-5, subtus vix prominentes, supra evanidi; foliola lateralia minima, 0.8-5 mm. longa, 0.5-2.5 mm. lata, lanceolata vel ovato-lanceolata, utrinque subaequaliter attenuata et acutiuscula. *Inflorescentia* 1-3-flora; pedunculus crassus, circ. 1 mm. longus, glaber; bractae oppositae, latissime triangulari-ovatae, subconnatae, 0.5 mm. longae, 1 mm. latae, fuscae, glabrae; pedicelli subnulli; alabastra obovata, glabra, 5 mm. longa, apice 2 mm. crassa. *Calyx* glaber, carnosulus, infundibuliformis, 6 mm. longus, dentibus 4 ovato-triangularibus 1-1.5 mm. longis acutis. *Petala* non visa. *Fructus* fusce subrufescens, valde compressus, ovoideus, apice rostrato-acuminatus, basi calyce 4-fido persistente, laciniis linearibus ad 6 mm. longis suffultus, 9-11 mm. longus, 5-6 mm. latus, 3 mm. spissus, rostro acuto 2-3 mm. longo; exocarpium tenue fere

exsuccum ; endocarpium ovoideo-acutum 7.5–8 mm. longum, 4 mm. latum, 2.5–3 mm. spissum, biloculare, loculis (an semper?) inaequalibus.

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 840 m., shrub 2 m., fls. dull red, leaves pale green, 20 Oct., No. 4385. Vernac.—*Didin*.

*C. Drake-Brockmanii* Sprague in Hook. Ic. Pl. t. 3112 (1927).

SOMALILAND : Ali Wein Mt., long. 45° 15' E., lat. 10° 24' N., 450 m., steep sandstone slopes, small shrub 0.5 m., fruits purplish, Jan., No. 4818.—Endemic.

*C. erythraea* Engl. in DC. Monogr. Phan. 4 : 20 (1883).

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., tangled shrub, to 3 m., stems white, fls. yellow, 20 m., No. 4181. Duwi, long. 44° 15' E., lat. 10° 5' N., 840–990 m., steep rocky slopes, shrub 3 m., white stem, dominant in places, Oct., No. 4388. Vernac.—*Hagar*.

*C. flaviflora* Engl. Bot. Jahrb. 34 : 304 (1904).

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., Oct., No. 4198. Vernac.—*Rahan reb.*—Endemic.

*Commiphora Gillettii* Chiov. sp. nov. (§*Glabra*, *Integrifoliolata*).

Frutex inermis, divaricato-ramosus, ramis potius elongatis 2–13 mm. longis prope basin 2.5–3.5 mm. crassis, cortice cinereo plus minusve fusco variegato, interdum albicante ; brachyblasti 1–3 mm. longi, 1.5 mm. lati, transverse corrugati, folia fasciculata 3–4 et fructus 1 vel interdum 2 gerentes. *Folia* semper trifoliolata, glaberrima ; petiolus gracilis, 2.5–7 mm. longus, leviter compressus, utrinque convexus subtus magis, 0.3–4 mm. latus ; foliola integerrima, sessilia, linearia, medium 8–17 mm. longum 0.6–1.1 mm. latum, ex apice rotundato sensim usque ad basin angustatum ; lateralibus mediano similia sed paulo breviora, 5–14 mm. longa, interdum plus minusve falcata, vix rigidula, utrinque concoloria, etiam sicco laete viridia ; costa subtus concolor, leviter prominens, supra impressa, fusca ; nervi omnino evanidi. *Pedicelli* fructiferi 2 mm. longi, tenues, glabri. *Calyx* submembranaceus, ample cupulatus vel plus minusve explanatus, basin fructus laxissime amplectens, circ. 2 mm. latus, dentibus 4 late triangularibus 0.25 mm. longis praeditus. *Fructus* non perfecte maturus ovoideus, 4.5 mm. longus, basi breviter contractus, apice breviter sed manifeste apiculatus, non compressus, 2.5–3 mm. diam., fuscus, longitudinaliter lineis 4 pallidis subtilibus aequidistantibus signatus.

SOMALILAND : Near Haiti tug, long. 45° 20' E., lat. 10° 22' N., 300 m., 2 m., very aromatic, fruits purplish, 5 Jan., No. 4817 (type in Kew Herb.).

*Commiphora Gowello* Sprague l.c. t. 3109.

SOMALILAND : Eil Demet, long. 44° 17' E., lat. 9° 53' N., 930 m., Oct., No. 4309. Boundary Pillar 99, long. 44° 39' E., lat. 8° 47' N., 1,140 m., shrub 1 m., fls. greenish yellow, almost sessile, aromatic, Oct., No. 4141 ; 4135. Vernac.—*Goah Tubbuk*.—Endemic.

*C. lughensis* Chiov. Fl. Somala 2 : 105 (1932) (fide Chiov.).

SOMALILAND : Wobleh, tree up to 6 m., bark white, Nov., No. 4587. Vernac.—*Hagar ad.*—Endemic.

*Commiphora obovata* Chiov. sp. nov. (§*Glabra*, *Integrifoliolata*) ; affinis *C. abyssinicae* Engl. a qua spinis subulatis gracilioribus, foliolis mediis obovatis integris, cortice cinereo-nigricante plicato-fissurato distincta.

Frutex ramis intricatis elongatis, juvenilibus glabris subulatis 2.5-3.5 cm. longis, e basi 1-1.5 mm. crassa sensim angustatis prius pruinoso-nigricantibus, demum siccando albescentibus acutissimis tenuibus tandem spinosis, folia 3-7 solitaria gerentibus, internodiis usque 17 mm. longis cylindricis ; brachyblasti hemisphaerici in ramis adultis 2-3 mm. longis et latis, interdum ad basin ramulorum elongatorum tenuium ad instar pulvinis positi ; rami senescentes cortice atro-cinereo, longitudinaliter plicatulo et minute fissurato. *Folia* omnia trifoliolata, vel interdum foliolo abortivo bifoliolata, glaberrima, in brachyblastis 3-5 fasciculata ; petiolus 1-3 mm. longus, gracilis ; foliolum medium obovatum, 4-13 mm. longum 2.5-10 mm. latum, apice ample rotundatum, integrum vel majora interdum levissime undulato-crenulata, basi cuneatum, sessile ; lateralia minima, ovata vel elliptica vel obovata, 1-2 mm. longa, 0.5-1 mm. lata, obtusa ; supra etiam sicco laete viridia, costa nervis utrinque 3-4 et venis reticulatis leviter impressis ; subtus vix pallidiora, costa elevata, nervis vix conspicuis, venis obsoletis. *Drupa* subglobosa, 9-10 mm. diam. magna, apice breviter apiculata ; endocarpium dorso leviter compressum, late convexum antice longitudinaliter angulo obtusiusculo ab apice usque ad basin carinatum ; loculi duo, dorsale angustum sterile, anticum seminiferum.

SOMALILAND : Boundary Pillar 93, shrub 2 m., leaves glossy, 6 Oct., No. 4185 (type in Kew Herb.). Vernac.—*Shan maleiss*.

*C. ogadensis* Chiov. Fl. Somala 2 : 103 (1932) (fide Chiov.).

SOMALILAND : Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,020-1,440 m., bush up to 5 m., Nov., No. 4586. Vernac.—*Hagar medu*.—Also in Abyssinia.

*C. Opobalsamum* Engl. var. *induta* Sprague.

SOMALILAND : near Eil Demet, long. 44° 17' E., lat. 9° 53' N., lava slopes, common shrub 2 m., Oct., No. 4307. Vernac.—*Daseno*.—Endemic.

*Commiphora Playfairi* (Hook. f.) Engl. in Engl. & Prantl Nat. Pflanzenfam. 3, 4 : 253 (1896).

SOMALILAND : Boundary Pillar 99, long. 44° 39' E., lat. 8° 47' N., 1,140 m., shrub to 1.5 m., fls. reddish, Oct., No. 4143 ; 4145. Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., shrub 2 m., fls. reddish, Oct., No. 4160. Duwi, 1,200 m., Oct., No. 4378. Vernac.—*Golelu*.—Endemic.

*C. resiniflua* Martelli Fl. Bogos. 15 (1886).

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., shrub 2-3 m., Oct., No. 4216.

ABYSSINIA : Gafra Valley, long. 42° 13' E., lat. 9° 21' N., 1,500 m., deciduous scrub on granite slopes, small tree to 3 m., fls. dark red, Feb., No. 5068. Vernac.—*Tubbuk* (Somali) ; *Anka* (Abyss.).—Also in Eritrea.

*C. rostrata* Engl. in Ann. Ist. Bot. Roma 7 : 17 (1897).

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., shrub 2 m., fls. red, Oct., No. 4210. Camp 4, long. 44° 16' E., lat. 10° N., 920 m., shrub 1 m., very aromatic, fls. dark red, Oct., No. 4352. Vernac.—*Chinow* ; *Ali-oi-e*.—Endemic.

*C. samharensis* Schweinf. in Bull. Herb. Boiss. 7, App. 2 : 290 (1899).

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., shrub 2 m., fls. deep red, Oct., No. 4165. Vernac.—*Shan-mal-ais*.—Also in Eritrea.

*C. Schimperii* Engl. in DC. Monogr. Phan. 4 : 13 (1883).

SOMALILAND : Boundary Pillar 105, long. 44° 10' E., lat. 8° 57' N., 1,290 m., in shallow soil, small shrub, Oct., No. 4233.

*C. Tubuk* Sprague in Hook. Ic. Pl. t. 3108 (1927).

SOMALILAND : near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 960 m., lava slopes facing south, shrub 2 m., Oct., No. 4310. Afard, long. 44° 8' E., lat. 10° 8' N., 1,050 m., shrub 1 m., Oct., No. 4463. Vernac.—*Ged Goah*.—Endemic.

#### MELIACEAE.

*Trichilia Volkensii* Gürke in Engl. Bot. Jahrb. 19 : Beibl. 47 : 33 (1894).

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,340 m., on limestone, in remnants of *Podocarpus* forest, bushy tree, 4 m., fls. cream, Feb., No. 5126. Vernac.—*Tintoline*.

*Ekebergia Ruppeliana* A. Rich.—F.T.A. 1 : 333.

ABYSSINIA : Boesesa valley, long. 42° 18' E., lat. 9° 29' N., 2,010 m., on granite, in remnants of evergreen forests, tree 8 m., fls. cream, Feb., No. 5172. Vernac.—*Löl*.

*Turraea Holstii* Gürke in Engl. Bot. Jahrb. 19 : Beibl. 47 : 35 (1894).

ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 25' N., 2,130 m., in *Podocarpus* forest, shrub 5 m., seeds orange, Mar., No. 5410.

*T. parvifolia* Defflers. in Bull. Soc. Bot. Fr. 42 : 301 (1895).

SOMALILAND : Daraweina, long. 44° 10' E., lat. 9° 43' N., 1,110 m., bush 4 m., fls. yellow, Oct., No. 4285. Vernac.—*Domai*.

#### SAPINDACEAE.

*Cardiospermum Corindum* Linn. Sp. Pl. ed. II. 526 (1762), *C. canescens* Wall.—F.T.A. 1 : 418.

SOMALILAND : Buramo, long. 43° 12' E., lat. 10° 1' N., 1,200 m., in *Acacia* open wood, climber, fls. white tipped with orange, Jan., No. 4887.

*C. Halicacabum* Linn.—F.T.A. 1 : 417 ; F.W.T.A. 1 : 498.

SOMALILAND ? Buramo, long. 43° 10' E., lat. 10° N., 1,380 m., in *Acacia* open wood, Jan., No. 4842.

*Allophylus abyssinicus* (Hochst.) Radlk. in Engl. & Prantl, Nat. Pflanzenf. 3, 5 : 313 (1895).

ABYSSINIA : Geldid, long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 15'$  N., 2,280–2,400 m., on limestone in half cleared *Podocarpus* forest, tree 5 m., fls. cream, Mar., No. 5392.

*A. rubrifolius* Engl. Hochgebirgsfl. 892 (1892).

SOMALILAND : Jifa Uri, long.  $43^{\circ} 22'$  E., lat.  $9^{\circ} 42'$  N., 1,680 m., on gneiss kopje, shrub 2 m., fls. yellowish, Jan., No. 4836. Hargeisa, 1,410 m., Oct., No. 4257.

*Dodonaea viscosa* Linn.—F.T.A. 1 : 433 ; F.W.T.A. 1 : 500.

SOMALILAND : Buramo, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ}$  N., 1,500 m., among Acacias, shrub 2 m., fls. purplish green, Jan., No. 4857. Vernac.—*Hairimat*.

*Pappea capensis* (Spreng.) Eckl. & Zeyh. Enum. Pl. Afr. Austr. 1 : 53 (1834). *P. Radlkoferi Schweinf.* *P. ugandensis Bak. f.* *P. fulva Conrath.* *P. Schumanniana Schinz.*

SOMALILAND : Libah Hele Mt., long.  $42^{\circ}$  E., lat.  $10^{\circ} 20'$  N., 1,200–1,800 m., in *Buxus* evergreen scrub, tree 6 m., Dec., No. 4705.

ABYSSINIA : Harar, long.  $42^{\circ} 10'$  E., lat.  $9^{\circ} 20'$  N., 1,650 m., on granite, Feb., No. 5058. Vernacs.—*Adadak* (Somali), and *Bika* (Abyss.).—Also in Eritrea.

#### MELIANTHACEAE.

*Bersama abyssinica* Fresen.—F.T.A. 1 : 434.

ABYSSINIA : Yuka, long.  $41^{\circ} 40'$  E., lat.  $9^{\circ} 25'$  N., 2,430 m., on limestone slopes in remnants of *Podocarpus* forest, tree 4 m., fls. white, Mar., No. 5428. Vernac.—*Sombo*.

#### ANACARDIACEAE.

*Rhus abyssinica* Hochst. ex A. Rich.—F.T.A. 1 : 438.

ABYSSINIA : Galla Pass, long.  $42^{\circ} 19'$  E., lat.  $9^{\circ} 28'$  N., 2,400 m., remnant of evergreen forest, 4 m., fls. greenish, Feb., No. 5204. Vernac.—*Gomo*.

*R. glutinosa* Hochst. ex A. Rich.—F.T.A. 1 : 438.

ABYSSINIA : Gafra valley, long.  $42^{\circ} 13'$  E., lat.  $9^{\circ} 21'$  N., 1,530 m., on granite slopes in upper deciduous scrub, shrub 2 m., Feb., No. 5073. Vernac.—*At esa*.—Also in Tanganyika Territory.

*R. natalensis* Bernh. ex Krauss in Flora 27 : 349 (1844).

SOMALILAND : Hargeisa, long.  $44^{\circ}$  E., lat.  $9^{\circ} 35'$  N., 1,350–1,530 m., on rocky slopes, shrub 3 m., Oct., No. 4270. Duwi, long.  $44^{\circ} 15'$  E., lat.  $10^{\circ} 5'$  N., 1,140 m., in *Buxus* scrub, 3 m., fls. greenish, Oct., No. 4411. Libah Hele Mt., long.  $43^{\circ}$  E., lat.  $10^{\circ} 20'$  N., 1,770 m., on fringe of *Juniperus* forest, shrub 2 m., Dec., No. 4707. Vernac.—*Ilka ade*.

*R. retinorrhoea* Steud.—F.T.A. 1 : 438.

SOMALILAND : Birda Mt., long.  $43^{\circ}$  E., lat.  $10^{\circ} 20'$  N., 1,620 m., on limestone cliffs with *Buxus*, shrub 2 m., fls. cream, Nov., No. 4675.

ABYSSINIA : Ridge south west of Harar, long.  $42^{\circ} 6'$  E., lat.  $9^{\circ} 17'$  N., 1,950 m., on limestone, shrub 2 m., Mar., No. 5249. Vernac.—*Mugan* (Abyss.).

*Heeria insignis* O. Ktze. Rev. Gen. 1: 152 (1891); F.W.T.A. 1: 512. *Rhus insignis* Del.—F.T.A. 1: 437.

SOMALILAND: Birda Mt., long. 43° E., lat. 10° 20' N., 1,590 m., on limestone in *Buxus* scrub, small tree 3 m., Nov., No. 4674.

ABYSSINIA: Gobelli, long. 41° 59' E., lat. 9° 10' N., 1,650 m., Mar., No. 5258. Vernac.—*Wigir ad ad* (Somali).

*Lannea malifolia* (Chiov.) Hutch. et E. A. Bruce, comb. nov. *Odina malifolia* Chiov. Fl. Somala 133, tab. 12, fig. 1 (1929).

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,260 m., in *Buxus* scrub, tree 7 m., fls. greenish, Oct., No. 4421; long. 43° 16' E., lat. 10° 5' N., 1,140 m., on rock, with *Buxus*, tree 4 m., Nov., No. 4596. Goton E., long. 42° 54' E., lat. 10° 9' N., 1,530 m., on limestone slope with *Combretum-Grewia-Dodonaea*, tree 5 m., fls. yellowish, Nov., No. 4637. Vernacs.—*Hria eji*; *Bero*.—Endemic.

*L. Schimperi* (Hochst.) Engl. in Engl. & Prantl, Pflanzenfam. Nachtr. 1: 213 (1897).

ABYSSINIA: Gobelli valley, long. 41° 59' E., lat. 9° 10' N., 1,500 m., on granite in evergreen scrub, tree 4 m., Mar., No. 5263. Vernac.—*Dareko*.

*L. triphylla* Engl. in Engl. & Prantl, Pflanzenfam. Nachtr. 1: 213 (1897).

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., shrub 2 m., Oct., No. 4183. Vernac.—*Lejidi*.

*Pistacia falcata* Becc. ex Martelli Fl. Bogos. 24 (1886).

SOMALILAND: Auboba, long. 43° E., 10° 6' N., 1,620 m., on mountain slope with *Dodonaea-Acokanthera*, tree 10 m., Nov., No. 4619. Vernac.—*Hra-a-mali*.

*P. Lentiscus* L. var. *emarginata* Engl. in DC. Monogr. 4: 286 (1883).

SOMALILAND: Libah Hele Mt., long. 43° E., lat. 10° 20' N., 1,560–1,790 m., on limestone in *Buxus-Juniperus* scrub, tree 4 m., Dec., No. 4697. Vernac.—*Ula aso*.

#### ARALIACEAE.

*Cussonia Holstii* Harms ex Engl. in Abh. Preuss. Akad. Wiss. 64 (1894).

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,110–1,260 m., in *Buxus* scrub, tree 6 m. high, Oct., No. 4416.

ABYSSINIA: Gobelli, long. 41° 59' E., lat. 9° 10' N., 1,590 m., Mar., No. 5268. Vernac.—*Wahara gu* (Somali).

*Schefflera abyssinica* (Hochst.) Harms in Engl. & Prantl, Nat. Pflanzenfam. 3, 8: 38 (1894).

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,340 m., in remnants of evergreen forest, spreading tree like a walnut, 20 m. high, fls. yellow, Feb., No. 5124. Vernac.—*Mafratu*.—Also in Uganda.

UMBELLIFERAE.

*Hydrocotyle asiatica* Linn.—F.T.A. 3 : 6 ; F.W.T.A. 1 : 522.

ABYSSINIA : Goria-Kolubi track, long.  $41^{\circ} 45' E.$ , lat.  $9^{\circ} 22' N.$ , 2,610 m., in grassland, fls. purplish, Mar., No. 5403.

*H. monticola* Hook. f.—F.W.T.A. 1 : 522.

ABYSSINIA : Geldid, long.  $41^{\circ} 48' E.$ , lat.  $9^{\circ} 15' N.$ , 2,430 m., in open marsh, fls. purple, Mar., No. 5386.

*H. natans* Cyr.—F.T.A. 3 : 5.

ABYSSINIA : Kolubi-Harar road, long.  $41^{\circ} 50' E.$ , lat.  $9^{\circ} 25' N.$ , 2,100 m., in pools of water and on limestone mud, fls. greenish, growing densely, Mar., No. 5462.

*Pimpinella Neumannii* Engl. in Sitz. Preuss. Akad. Wiss. 40 : 746 (1906), nomen.

Herba usque ad 30 cm. alta, heterophylla, basi foliorum reliquiis fibrosis induta ; caules crebre costati, pubescentes. *Folia* fere glabra, valde variabilia, pauca simplicia et ovato-elliptica, basi cordata, apice rotundata, circiter 2 cm. longa et 1 cm. lata, crenatodentata, alia trifoliolata, foliolis folio simplici similibus, caetera pinnatipartita, segmentis linearibus subintegris ; petioli pubescentes. *Umbellae* longe pedunculatae, compositae, primariae circiter 12-radiatae, secundariae circiter 20-radiatae, ebracteatae ; pedunculi secundarii circiter 2 cm. longi, pubescentes ; pedicelli 2–3 mm. longi, pubescentes. *Flores* albi. *Calyx* obsoletus. *Petala* obovata, circiter 1 mm. longa, extra parte pubescentia. *Stamina* petalis leviter longiora. *Hypanthium* ovoideo-ellipsoideum, dense pubescens. *Styli* divergentes.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48' E.$ , lat.  $9^{\circ} 12' N.$ , 2,730 m., on limestone in *Podocarpus-Juniperus* forest, fls. white, 3 Mar., No. 5324.

*P. sinensis* Benth. & Hk. f.—F.T.A. 3 : 14.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48' E.$ , lat.  $9^{\circ} 12' N.$ , 2,700 m., in evergreen forest, fls. white, Mar., No. 5299.

*Apium nodiflorum* Linn.—F.T.A. 3 : 11.

ABYSSINIA : Geldid, long.  $41^{\circ} 48' E.$ , lat.  $9^{\circ} 15' N.$ , 2,430 m., in shaded marsh, fls. white, stem trailing, Mar., No. 5385.

*Peucedanum fraxinifolium* Hiern—F.T.A. 3 : 22 ; F.W.T.A. 1 : 523.

SOMALILAND : Duwi Pass, long.  $44^{\circ} 15' E.$ , lat.  $10^{\circ} 5' N.$ , 900 m., steep rocky slopes in gullies, tree 3 m. high, Oct., No. 4383. Vernac.—*Ged Bidawi*.

*Sanicula europaea* Linn.—F.T.A. 3 : 8 ; F.W.T.A. 1 : 523.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48' E.$ , lat.  $9^{\circ} 12' N.$ , 2,580 m., on limestone, fls. white, Mar., No. 5297.

*Torilis arvensis* (Huds.) Link Enum. Hort. Berol. 1 : 265 (1821–2). *Caucalis arvensis* Huds. *C. infesta* (Linn.) Spreng.—F.T.A. 3 : 26.

ABYSSINIA : Yuka, long.  $41^{\circ} 40' E.$ , lat.  $9^{\circ} 25' N.$ , 2,700 m., on limestone near stream, fls. white, Mar., No. 5441.

*Caucalis incognita* Norman in Journ. Bot. 1934: 205.

ABYSSINIA: Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,580 m., on limestone in damp places, fls. white, fruit with reddish-brown bristles, Mar., No. 5295.

*C. melanantha* Steud.—F.T.A. 3: 26; F.W.T.A. 1: 523.

ABYSSINIA: Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,820 m., on short grass, fls. dark purple, Mar., No. 5325.

*Conium maculatum* Linn.—F.T.A. 3: 9.

ABYSSINIA: Kondudo Mt., long.  $42^{\circ} 20'$  E., lat.  $9^{\circ} 27'$  N., 2,520 m., on limestone slopes, fls. white, Feb., No. 5208. Vernac.—*Chof chof*.

*Daucus Carota* Linn.—F.T.A. 3: 25.

ADEN: 150–360 m., on lava in shady places, fls. white, Mar., No. 5500.

*Ferula communis* Linn.—F.T.A. 3: 18.

SOMALILAND: Wobleh mt., long.  $43^{\circ} 17'$  E., lat.  $10^{\circ} 15'$  N., 1,620 m., open gaps among Juniper, leaves glaucous, Feb., No. 4986.

*Malabaila abyssinica* Boiss.—F.T.A. 3: 24.

ABYSSINIA: Kondudo Mt., long.  $42^{\circ} 20'$  E., lat.  $9^{\circ} 27'$  N., 2,700 m., in rank herbage on N. facing limestone slope, fls. white, plant 1.6 m. high, Feb., No. 5217. Vernac.—*Mara ma chichite*.

#### ERICACEAE.

*Erica arborea* Linn.—F.T.A. 3: 483.

ABYSSINIA: Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,820 m., limestone mtn., dominant, shrub 3 m., 3 Mar., No. 5307. Vernac.—*Wadadi*.

#### EBENACEAE.

*Euclea Kellau* Hochst.—F.T.A. 3: 514.

SOMALILAND: Hargeisa, long.  $44^{\circ}$  E., lat.  $9^{\circ} 35'$  N., 1,530 m., on rocks, shrub 1 m., Oct., No. 4272. Barataga, long.  $44^{\circ} 1'$  E., lat.  $10^{\circ} 5'$  N., 1,290 m., in *Buxus-Acokanthera* scrub, shrub 3 m., Oct., No. 4520.

ABYSSINIA: Gafra valley, long.  $42^{\circ} 13'$  E., lat.  $9^{\circ} 21'$  N., 1,590 m., shrub 2 m., fls. white, Feb., No. 5069. Vernac.—*Mayer* (Somali); *Dubobis*; *Dudohō*.

#### SAPOTACEAE.

*Sideroxylon diospyroides* Baker—F.T.A. 3: 502.

SOMALILAND: Barataga Mtn., long.  $44^{\circ} 1'$  E., lat.  $10^{\circ} 9'$  N., 1,290 m., in *Buxus-Acokanthera* scrub, fls. cream, Oct., No. 4516. Libah Hele Mtn., long.  $43^{\circ}$  E., lat.  $10^{\circ} 20'$  N., 1,410 m., spreading tree 5 m., fls. brownish, Dec., No. 4701. Dobo Pass, long.  $43^{\circ} 15'$  E., lat.  $10^{\circ} 15'$  N., 1,140 m., limestone gorge, tree 4 m., fls. cream, Feb., No. 4960. Vernac.—*Berde yer*; *Hamesh*.



*Sideroxylon Gillettii* Hutch. et E. A. Bruce, sp. nov., affinis *S. Oxyacanthae* Baill., sed foliis spatulato-obovatis nervis lateralibus paucioribus, floribus subsessilibus staminodiis caudato-apiculatis differt.

Arbor parva, ad 6 m. alta; rami mox glabri; ramuli hornotini cinereo-puberuli, interdum apice spinosi. *Folia* breviter petiolata, spatulato-obovata, apice rotundata, basi angustata, 2.5–3.5 cm. longa, 1–1.5 cm. lata, coriacea, infra glauco-viridia, glabra, nervis indistinctis. *Flores* subsessiles, in axillis foliorum glomerati. *Calyx* profunde lobatus; lobi ovati, apice subacuti, 1.5 mm. longi, adpresse pubescentes. *Corollae* *tubus* late campanulatus, circiter 1 mm. longus, fauce 2 mm. diametro, glaber; lobi 5, ovati, apice acuti, 1.2 mm. longi, glabri. *Stamina* basi corollae loborum inserta, filamentis patulis circiter 2 mm. longis, antheris parvis oblongis 0.5 mm. longis. *Staminodia* ovato-triangularia, circiter 0.6 mm. longa (apice excluso), apice longe caudata (0.5 mm.) et lateraliter 2-dentata. *Ovarium* subglobosum, dense hirsutum, 1 mm. longum, stylo 3 mm. longo basi excepta glabro.

SOMALILAND: Auboba, 1,740 m., 21 Sept., No. 4622. Auboba, long. 43° E., lat. 10° 6' N., 1,710–1,830 m., on limestone slopes with *Acokanthera*, *Olea*, *Combretum* and *Dodonaea*, tree 6 m., fls. cream, 21 Nov., No. 4624. Rarele Mt., near Buramo, long. 43° 15' E., lat. 10° N., 1,740 m., on gneiss slopes, small tree 4 m., fls. dull, 29 Dec., No. 4733 (type in Kew Herb.). Vernac.—*She*.

*Sideroxylon Oxyacantha* Baill. in Bull. Soc. Linn. Paris 943 (1891).

ABYSSINIA: Kondudo Mt., long. 42° 18' E., lat. 9° 27' N., 2,100 m., in *Juniperus* forest, tree 4 m., fls. white, Feb., No. 5107. Vernac.—*Gombolelea*.

*Mimusops Kummel* Hochst.—F.T.A. 3: 508.

SOMALILAND: Biju Suldán, long. 43° E., lat. 10° 20' N., 980–1,350 m., limestone slopes, tree 10 m., Dec., No. 4690.

ABYSSINIA: Gafra valley, long. 42° 13' E., lat. 9° 21' N., 1,500 m., tree 30 m., fls. white, Feb., No. 5242. Vernac.—*Anjel* (Somali); *Naga Kadadi* (Abyss.).

#### MYRSINACEAE.

*Maesa lanceolata* Forssk.—F.T.A. 3: 492; F.W.T.A. 2: 16.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,100 m., tree 6 m., fls. cream, Feb., No. 5128. Vernac.—*Abaiyi*.

*Myrsine africana* Linn.—F.T.A. 3: 493.

SOMALILAND: Jifa meidir, long. 43° 15' E., lat. 9° 43' N., 1,740 m., 60 cm., fls. dark red, Jan., No. 4867.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,400 m., 1 m., Feb., No. 5143. Vernac.—*Gujamo*.

#### LOGANIACEAE.

*Buddleja polystachya* Fresen.—F.T.A. 4, 1: 515.

ABYSSINIA: Gara Mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,430 m., small tree, 4 m., fls. orange, Mar., No. 5283.

*Lachnopylis congesta* (R. Br.) C. A. Smith in Kew Bull. 1930 : 17.  
*Nuxia congesta* R. Br.—F.T.A. 4, 1 : 512.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,460 m., tree 12 m., fls. white, Feb., No. 5156.

*L. oppositifolia* Hochst. in Flora 26 : 77 (1843). *Nuxia dentata* R. Br.—F.T.A. 4, 1 : 513.

SOMALILAND : Bija sultan, long. 43° E., lat. 10° 20' N., 1,110 m., willow-like tree up to 6 m., fls. white, Dec., No. 4693. Vernac.—*Defdid*. Wood used for making milk-vessels.

#### OLEACEAE.

*Olea chrysophylla* Lamk.—F.T.A. 4, 1 : 18. *O. somalensis* Baker—F.T.A. 4, 1 : 18.

SOMALILAND : Simodi, long. 43° 30' E., lat. 10° 5' N., 1,260–1,740 m., common, small tree 5 m., Nov., No. 4566. Berdale Mt., long. 43° E., lat. 10° 20' N., 1,380–1,710 m., on schist, tree 8 m., Dec., No. 4683.

ABYSSINIA : Sarerta Mt., long. 42° 19' E., lat. 9° 30' N., 2,400 m., tree 6 m., Feb., No. 5179. Vernac.—*Wigir* (Somali) ; *Wera* (Abyss.).

*O. Hochstetteri* Baker—F.T.A. 4, 1 : 17.

ABYSSINIA : Gara Mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,730 m., limestone, tree 20 m., fls. white, Mar., No. 5358.

*Jasminum abyssinicum* R. Br.—F.T.A. 4, 1 : 11.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,550 m., fls. white, fragrant, Feb., No. 5151. Gara Mulata Mt., 2,790 m., climber, fls. white, Mar., No. 5326.

*J. floribundum* R. Br.—F.T.A. 4, 1 : 13.

SOMALILAND : Hargeisa, long. 44° E., lat. 9° 35' N., 1,530 m., on rocks, shrub 2 m., fls. white, red outside, Oct., No. 4271.

ABYSSINIA : Harar, long. 42° 10' E., lat. 9° 20' N., 1,650 m., climber, Feb., No. 5050. Vernac.—*Bilu*.

*J. mauritianum* Boj.—F.T.A. 4, 1 : 10.

SOMALILAND : Satoa, long. 43° 5' E., lat. 9° 59' N., 1,500 m., on steep slopes, fls. white, very fragrant, Nov., No. 4616. Buramo, Dumuk, long. 43° 12' E., lat. 10° 1' N., 1,170 m., fls. white, Jan., No. 4889. Vernac.—*Da-ali*.

*J. Steudneri* Schweinf. ex Baker—F.T.A. 4, 1 : 12.

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 1,140 m., scandent shrub, fls. white, red outside, sweetly scented at night, Oct., No. 4408. Vernac.—*Dumbar*.

#### APOCYNACEAE.

*Adenium obesum* (Forssk.) Roem. & Sch. Syst. 4 : 411 (1819).

*A. coetaneum* Stapf—F.T.A. 4, 1 : 227.

ADEN : 210 m., on lava, 1 m., fls. rose, Mar., No. 5508.

*A. somalense* Balf. f.—F.T.A. 4, 1 : 228.

SOMALILAND : long. 44° 18' E., lat. 9° 57' N., 810 m., small shrub, 0.3 m., fls. bright red, Oct., No. 4343.

var. *crispum* Chiov.

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., shrub 0.5 m., fls. bright red, Oct., No. 4149. Vernac.—*Warrab Karon*.

*Acokanthera Schimperii* Schweinf.—F.T.A. 4, 1 : 93.

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 1,050–1,200 m., small tree 5 m., arrow poison, Oct., No. 4380. Auboba, long. 43° E., lat. 10° 6' N., 1,590–1,800 m., on limestone slopes, shrub 5 m., fls. pink and white, sweet scented, Nov., No. 4621.

ABYSSINIA : Gobelli, long. 41° 59' E., lat. 9° 10' N., 1,590 m., on granite slopes, tree 4 m., fls. pinkish, Mar., No. 5265. Vernac.—*Waba* (Somali) ; *Gararo* (Abyss.).

*Carissa edulis* Vahl—F.T.A. 4, 1 : 89.

SOMALILAND : Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,740 m., on mountain top, weak shrub, fr. red, Nov., No. 4590.

ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,950 m., shrub 2 m., fls. pink and white, Feb., No. 5003.

var. *tomentosa* Stapf.

SOMALILAND : Wobleh, No. 4591.

ABYSSINIA : Harar, No. 5044. Vernac.—*Degwud* (Somali) ; *Agamsa* ; *Agam* (Abyss.).

#### ASCLEPIADACEAE.

*Periploca aphylla* Decne.—F.T.A. 4, 1 : 257.

SOMALILAND : Libah Hele Mt., long. 43° E., lat. 10° 20' N., 1,500 m., Dec., No. 4698. Vernac.—*Aan orle*.

*P. ephedriiformis* Schweinf. ex Defflers in Mém. Inst. Egypt. 3 : 256 (1896).

SOMALILAND : Kabri Bahr, long. 43° 44' E., lat. 10° 20' N., 750–900 m., shrub 3 m., fls. yellowish green, Nov., No. 4548.

ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 27' N., 1,680 m., 1 m., fls. yellowish green, Mar., No. 5456. Vernac.—*Gesa rioli* ; *Aan orle* (Somali).—Also in Arabia.

*P. linearifolia* Dill. & Rich.—F.T.A. 4, 1 : 257.

ABYSSINIA : Geldid, long. 41° 48' E., lat. 9° 15' N., 2,280 m., climber, fls. pale yellow, Mar., No. 5391.

*Cryptolepis Gillettii* Hutch. et E. A. Bruce, sp. nov. affinis *C. deciduae* N.E. Br., sed foliis et pedicellis puberulis, coronae lobis brevioribus differt.

Suffrutex 0.5 m. altus, intricate ramosus, ramis cinereis adultis 5 mm. diametro. *Folia* in ramulis abbreviatis disposita, subsessilia, lineari-oblongolata, obtuse mucronata, 2–2.5 cm. longa, circiter 3 mm. lata, utrinque minutissime puberula, nervis inconspicuis. *Flores* solitarii ; pedicelli 3–4 mm. longi, puberuli, basin versus bracteolis linearibus instructi. *Calycis lobi* lineari-lanceolati, subacuti, 2 mm. longi, puberuli. *Corollae tubus* 2 mm. longus ; lobi

lineares, 7 mm. longi, induplicati. *Coronae lobi* subulati. *Antherae* 1 mm. longae, acuminatae. *Folliculi* lineari-falcati, 6 cm. longi, glabri. *Semina* late linearia, 7 mm. longa, minute tuberculata.

SOMALILAND: Dubar, long. 45° 5' E., lat. 10° 20' N., 300 m., 0.5 m. high, fls. greenish yellow, 2 Jan., No. 4773 (type in Kew Herb.). Vernac.—*Ula as*.

*Secamone punctulata* Decne.—F.T.A. 4, 1: 284.

SOMALILAND: near Wabwanak Peak, long. 43° E., lat. 10° 20' N., 1,560 m., climber, fls. orange, Dec., No. 4711.

ABYSSINIA: Gobelli, long. 41° 59' E., lat. 9° 10' N., 1,590 m., fls. yellow, Mar., No. 5267. Vernac.—*Gesariad* (Somali).

*Cynanchum defoliascens* K. Schum.—F.T.A. 4: 400.

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., fls. greenish, Oct., No. 4187.—Endemic.

*Cynanchum falcatum* Hutch. et E. A. Bruce, sp. nov., affinis *C. hastifolio* N.E. Br., sed foliis basi haud hastatis pubescentibus linearibus falcatis differt.

Frutex scandens; caules graciles, pubescentes. *Folia* linearia, falcata, basi inaequaliter truncata vel rotundata, apice subacuta, 2–3.5 cm. longa, 2–3 mm. lata, utrinque crispato-pubescentia, costa media utrinque prominente; petioli 0.5–1 cm. longi, pubescentes. *Umbellae* subsessiles, 5–6-florae; pedicelli 3–4 mm. longi, parce puberuli. *Calycis lobi* ovato-triangulares, acuti, 1 mm. longi, puberuli. *Corollae lobi* oblongo-lanceolati, subacuti, 2.5 mm. longi, 1.5 mm. lati; tubus 1.5 mm. longus. *Corona* cupularis, 1.5–2 mm. alta, lobis latissimis circiter 2 mm. latis apice breviter cuspidatis. *Columna staminalis* corona brevior. *Antherarum appendices* membranaceae, ovato-orbiculares, 0.8 mm. longae. *Stylus* conicus, appendicibus antherarum subaequalis.

SOMALILAND: Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., fls. greenish-yellow, 4 Oct., No. 4114 (type in Kew Herb.). Vernac.—*Hayab*; *Gessariad*.

*C. hastifolium* N.E. Br.—F.T.A. 4, 1: 397.

SOMALILAND: Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,200 m., fls. green and white, Feb., No. 4952.

*C. sarcostemmatoides* K. Sch.—F.T.A. 4, 1: 399.

SOMALILAND: Hargeisa, 1,290 m., fls. cream, Sept., No. 3939. Vernac.—*Debina Dir*.

*C. somaliense* N.E. Br.—F.T.A. 4, 1: 398.

SOMALILAND: Hargeisa, 1,290 m., suffruticose, fls. dull yellow, Sept., No. 3977. Boundary Pillar 93, No. 4173. Vernac.—*Uneho*.—Endemic.

*C. validum* N.E. Br.—F.T.A. 4, 1: 398.

SOMALILAND: Libah Hele Range, long. 43° E., lat. 10° 20' N., 1,200 m., climbing with grey juicy stems, Dec., No. 4704. Jifa Meidir, long. 43° 15' E., lat. 9° 43' N., 1,710 m., fls. yellow with dark red at base of corona lobes, Jan., No. 4863. Vernac.—*Minsar*.

*Pentatropis spiralis* (Forssk.) Decne in Ann. Sci. Nat. Ser. 2, 9 : 327 (1838). *P. cynanchoides* R. Br.—F.A.T. 4, 1 : 380.

SOMALILAND : Hargeisa, fls. yellow, Sept., No. 4050. Biyu Arnot, long. 42° 42' E., lat. 10° 32' N., 840 m., climber, fls. cream, Nov., No. 4661. Vernac.—*Hayab*.

*Pergularia Daemia* (Forssk.) Chiov. Result. Sci. Miss. Stefan. Paoli Somal. Ital. 1 : 115 (1916). *Daemia extensa* R. Br.—F.T.A. 4, 1 : 387.

SOMALILAND : Hargeisa, 1,290 m., climbing, fls. green and cream, Sept., No. 3986.

var. *macrantha* Chiov.

SOMALILAND : Boundary Pillar 99, long. 44° 39' E., lat. 8° 47' N., 1,140 m., Oct., No. 4146. Vernac.—*Assuro*.

*P. tomentosa* Linn. Mant. 1 : 53 (1767). *Daemia cordata* R. Br.—F.T.A. 4, 1 : 386.

SOMALILAND : Elmis, long. 44° 14' E., lat. 10° 22' N., 480 m., fls. greenish yellow, tinged with red, Oct., No. 4500.

*Kanahia laniflora* R. Br.—F.T.A. 4, 1 : 296.

ABYSSINIA : Gafra Valley, long. 42° 13' E., lat. 9° 21' N., 1,500 m., 0.8 m., fls. white, Feb., No. 5237.

*Pentarrhinum insipidum* E. Mey.—F.T.A. 4, 1 : 378.

SOMALILAND : Hargeisa, 1,290 m., creeper, fls. cream, Sept., No. 3921. Vernac.—*Haayab* ; *Uneh*.

*Steinheiliana radians* (Forssk.) Decne in Ann. Sci. Nat. Ser. 2, 9 : 339, t. 12 (1838).

SOMALILAND : Berbera, corolla-tube brownish green, limb bright yellow, Jan., No. 4755. Vernac.—*Subka*.—Also in Arabia.

*Glossonema Boveanum* Decne—F.T.A. 4, 1 : 292.

SOMALILAND : Berbera, 30 m., plant whitish, fls. white and brown, Jan., No. 4762. Vernac.—*Subka*.

*Glossonema hispidum* Hutch. et E. A. Bruce, sp. nov. *G. Thruppii* Oliv. valde affinis sed foliis angustioribus et minoribus, pedunculo nullo (floribus fasciculatis) differt.

Caules prope basin ramosi, straminei, usque ad 15 cm. longi, hispidi. *Folia* sessilia, oblongo-ob lanceolata vel oblanceolata, apice rotundata et apiculata, basi angustata, 1.5–3 cm. longa, usque ad 1 cm. lata, margine hispidociliata, utrinque parce hispida, nervis inconspicuis. *Flores* pallide flavi, fasciculati, fasciculis extra-axillaribus 3–4-floris ; pedicelli 3 mm. longi, hispidi ; bractae subulatae. *Calycis lob*i lineari-subulati, 2.5 mm. longi, hispidi. *Corolla* late patelliformis, glabra, limbo circiter 7 mm. diametro, lobis ovato-triangularibus subobtusis 2.5 mm. longis. *Coronae lob*i ovato-elliptici, 2 mm. longi, apice emarginati et cucullati, dimidio superiore liberi, glabri. *Columna staminalis* 0.5 mm. longa. *Stylus* apice disciformis.

SOMALILAND : Boundary, long. 44° 10' E., lat. 8° 57' N., 1,260 m., fls. dull yellow, 29 Sept., No. 4081 (type in Kew Herb.). Vernac.—*Subka*.

*G. Revoilii* Franch.—F.T.A. 4, 1 : 292.

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., fls. yellow, Oct., No. 4218. Dobo Pass, long. 43° 15' E., lat. 10° 15' N., fls. yellow, with reddish brown centre, Feb., No. 4968. Vernac.—*Chumka* ; *Subka*.

*Calotropis procera* Ait.—F.T.A. 4, 1 : 294.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,260 m., shrub 3 m., fls. cream and purple, Sept., No. 4067. Vernac.—*Boah ad*.

*Asclepias flavida* N.E. Br.—F.T.A. 4, 1 : 331.

SOMALILAND : Hargeisa, fls. yellow with purple centre, Sept., No. 3980 ; 4047. Vernac.—*Dufeyo*.

*A. macrantha* Hochst.—F.T.A. 4, 1 : 340.

ABYSSINIA : Haramaia, long. 42° E., lat. 9° 24' N., 1,980 m., fls. red, tips of corona lobes deep yellow, Mar., No. 5468. Vernac.—*Harati-u*.

*Sarcostemma viminale* R. Br.—F.T.A. 4, 1 : 384.

SOMALILAND : Hargeisa, climber, Sept., No. 4072. Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., fls. cream, Oct., No. 4180 ; 4204. Marmar Range, long. 42° 47' E., lat. 10° 29' N., 1,530 m., Nov., No. 4658.

ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 27' N., 1,680 m., Mar., No. 5455. Vernac.—*Hangeyu* (Somali).

*Marsdenia Schimperii* Decne—F.T.A. 4, 1 : 419.

SOMALILAND : Buramo, long. 43° 10' E., lat. 10° N., 1,380 m., fls. white, fr. green, Jan., No. 4843.

*Ceropegia De-Vecchii* Chiov. Fl. Somalia 2 : 301 (1932).

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., climber, fls. dark red, mottled, Sept., No. 4073. Vernac.—*Marora gel*.—Endemic.

*Ceropegia nuda* Hutch. et E. A. Bruce, sp. nov. affinis *C. subaphyllae* K. Schum. sed corollae lobis linearibus, coronae lobis haud ciliatis differt.

Tuber fusiforme, edule, 7 cm. longum, 1.5 cm. diametro. Caules sarmentosi, succulenti, glauco-cinerei, circiter 3 mm. diametro, subaphylli. *Folia* rarissima, sessilia, lineari-lanceolata, 0.8 cm. longa, subacuta, glabra. *Flores* solitariae vel subsolitariae, atrorubri et cinerei ; pedicelli 6 mm. longi, glabri. *Calycis* lobi subulato-lineares, acuti, 5 mm. longi, glabri. *Corolla* circiter 4 cm. longa, extra scaberula ; tubus 2.5 cm. longus, infra medium leviter contractus, 2.5–3 mm. diametro, inferne intra pilis paucis instructus ; lobi lineares, apice cohaerentes, inferne scaberuli, superne glabri, 1.7 cm. longi. *Coronae* lobi lineares, inaequales, glabri ; interiores 2 mm. longi ; exteriores 1.2 mm. longi. *Carpella* immatura glabra.

SOMALILAND : Afard, long. 44° 8' E., lat. 10° 10' N., 480 m., succulent, climbing, fls. dark red and grey, 27 Oct., No. 4484 (type in Kew Herb.). Vernac.—*Maroro ari*.

*C. somalensis* Chiov. Result. Sci. Miss. Stefan.-Paoli Somal. Ital. 1: 116 (1916).

SOMALILAND: Boundary Pillar 93, fls. greenish cream flecked with dark red, Oct., No. 4212. Endemic.

*C. subaphylla* K. Schum.—F.T.A. 4, 1: 621.

SOMALILAND: Boundary, long. 45° 9' E., lat. 8° 37' N., 990 m., climbing, fls. green, Oct., No. 4190. Vernac.—*Maroro arri*.—Endemic.

*Leptadenia heterophylla* Decne.—F.T.A. 4, 1: 431.

SOMALILAND: Near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 930 m., fls. white, Oct., No. 4330.

*L. Spartum* Wight—F.T.A. 4, 1: 432.

SOMALILAND: Afard, long. 44° 8' E., lat. 10° 10' N., 510 m., shrub 2 m., fls. yellow, fragrant, Oct., No. 4438. Vernac.—*Moroh*.

*Caralluma Dicapuae* Chiov. in White & Sloane The Stapelieae ed. 2, 1: 186 (1937).

SOMALILAND: Hargeisa, long. 44° E., lat. 9° 33' N., 1,290 m., fls. greenish-brown, eaten by Somalis, Sept., No. 3993. Vernac.—*Fera Hunshu*.—Also in Eritrea.

*C. Edithae* N.E. Br.—F.T.A. 4, 1: 481.

SOMALILAND: Jalelo, long. 44° 14' E., lat. 9° 45' N., 1,080 m., 0.2 m., fls. dark red, Oct., No. 4289. Vernac.—*Udab tis*.—Endemic.

*C. priogonium* K. Schum. in Engl. Bot. Jahrb. 34: 327 (1905).

SOMALILAND: Hargeisa, 1,380 m., fls. very dark red, Oct., No. 4248. Vernac.—*Gōra ātu*.

*C. retrospicieus* N.E. Br.—F.T.A. 4, 1: 480.

SOMALILAND: Weranwis Valley, long. 43° 50' E., lat. 10° 15' N., 600 m., 0.6 m., fls. red-brown, Nov., No. 4533. Vernac.—*Udab tis*.

*C. socotrana* (Balf. f.) N.E. Br. in Gard. Chron. 12: 370 (1892).

SOMALILAND: Buramo, No. 4840. Vernac. *Gōra ātu*.—Also in Socotra.

*C. speciosa* N.E. Br.—F.T.A. 4, 1: 479.

SOMALILAND: Hargeisa, 1,440 m., fls. dark red, foetid smell, visited by flies, Sept., No. 4056. Vernac.—*Udab tis*.

*Echidnopsis somalensis* N.E. Br.—F.T.A. 4, 1: 477.

SOMALILAND: Simodi, long. 43° 30' E., lat. 10° 5' N., 1,200–1,740 m., creeping, succulent stems, fls. dark red, Nov., No. 4570. Vernac.—*Had uli*.—Endemic.

#### RUBIACEAE.

*Gardenia lutea* Fres.—Stapf & Hutch. in Journ. Linn. Soc. 38: 425 (1909).

ABYSSINIA: Gafra valley, long. 42° 13' E., lat. 9° 21' N., 1,500 m., tree 5 m., fls. white turning yellow, Feb., No. 5244.

*Tarenna graveolens* (S. Moore) Bremek. in Fedde Repert 37: 193 (1934).

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 35' N., 1,350 m., among rocks, shrub 2 m., fls. cream, Sept., No. 4035; near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 960 m., on lava slopes, shrub 2 m., sweetly scented, Oct., No. 4312. Duwi, long. 44° 15' E., lat. 10° 5' N., 1,200 m., in *Buxus-Acokanthera* scrub, tree 5 m., Oct., No. 4381. Vernac.—*Aino maye-i*; *barko*.

*Galimiera coffeoides* Del.—F.T.A. 3 : 114.

ABYSSINIA : Slopes of Sareta Mt., long. 42° 19' E., lat. 9° 30' N., 2,400 m., on limestone in evergreen forest, bushy tree 4 m., fls. pale lilac, Feb., No. 5193. Vernac.—*Sarbandai*.

*Pavetta abyssinica* Fresen.—F.T.A. 3 : 173.

ABYSSINIA : Harar, long. 42° 19' E., lat. 9° 28' N., 2,400 m., shrub 2 m., fls. white, fragrant, Feb., No. 5147.

*P. Hochstetteri* Bremek. in Fedde Repert. 37 : 182 (1934).

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., shrub, 2 m., fls. greenish cream, Sept., No. 3987a. Duwi, long. 44° 15' E., lat. 10° 5' N., 1,140 m., in *Buxus* scrub, shrub 3 m., fls. rich yellow, fragrant, Oct., No. 4409.

ABYSSINIA : Gafra valley, long. 42° 13' E., lat. 9° 21' N., 1,500 m., on granite, bush 2 m., fls. yellow, Feb., No. 5245. Vernac.—*Aino maye-i* (Somali).

*Pavetta venenata* Hutch. et E. A. Bruce, sp. nov. affinis *P. subcanae* Hiern sed foliis minutissime papilloso-puberulis, corolla extra glabra differt.

Fruticulus usque ad 0.5 m. altus, cortice maturo pallide cinereo ; ramuli hornotini minutissime puberuli. *Folia* oblanceolata, apice obtusa, basi acutissima, 4-5 cm. longa, 1-1.5 cm. lata, glauco-viridia, infra pallidiora et minutissime papilloso-puberula ; nervi laterales utrinsecus circiter 5-7, obscuri ; petioli alati, usque ad 0.5 cm. longi, puberuli ; stipulae basi late triangulares, subulato-acuminatae, usque ad 4 mm. longae, puberulae. *Cymae* terminales, subsessiles, pauciflorae ; bracteae parvae, subulatae ; pedicelli 2-3 mm. longi, puberuli. *Receptaculum* campanulatum, 1.5 mm. longum, puberulum. *Calycis* *tubus* 1 mm. longus, minute denticulatus. *Corollae* *tubus* 2-2.3 cm. longus, sicco 1.25 mm. diametro, glaber ; lobi oblongo-obovati, 6 mm. longi. *Antherae* partim exsertae, 5 mm. longae. *Stylus* longe exsertus, glaber, stigmate clavato. *Fructus* sicco niger, globosus, nitidus, minutissime puberulus.

SOMALILAND : Jalelo, long. 44° 14' E., lat. 9° 45' N., 1,080 m., amongst archaean schist rocks, shrub to  $\frac{1}{2}$  m. high. 16 Oct., No. 4290 (type in Kew Herb.). Vernac.—*Rogumba*. Poisonous to stock.

This has also been collected by Mr. E. F. Peck on the Mirso Ridge, about 15 miles east of Sheikh, and with the same vernacular name.

*Canthium bogosensis* (Mart.) Hutch. & E. A. Bruce, comb. nov. *Plectronia bogosensis* Mart. Fl. Bogos. 42 (1886).

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 1,140 m., in *Buxus* scrub, shrub 3 m., Oct., No. 4405. Vernac.—*Gorurgi*.

*Vangueria apiculata* K. Schum. in Engl. Pflanzenw. Ost. Afr. C : 385 (1895).

ABYSSINIA : Harar, No. 5060.

*Pentas Schimperiana* (A. Rich.) Vatke—F.T.A. 3 : 45.

ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,790 m., 1 m., fls. white, Mar., No. 5327.



*Oldenlandia monanthos* (Hochst.) Hiern—F.T.A. 3 : 60.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,190 m., prostrate, fls. pink, Feb., No. 5113.

*O. rotata* Baker in Kew Bull. 1895 : 216.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 34' N., 1,350 m., fls. white, opening in evening, Sept., No. 4023. Afard, long. 44° 8' E., lat. 10° 10' N., 540 m., on schist slopes, fls. cream, Oct. No. 4461. Vernac.—*Burkwa allele*.—Endemic.

*O. Schimper* T. Anders.—F.T.A. 3 : 55.

SOMALILAND : Kabalgabat Pass, long. 43° E., lat. 10° 20' N., 990 m., on sand, corolla-limb white, tube brownish, Dec., No. 4688. Aden : 210 m., lava slopes, Mar., No. 5487. Vernac.—*Adar*.

*Pentanopsis fragrans* Rendle in Journ. Bot. 1898 : 29.

SOMALILAND : Afard, long. 44° 8' E., lat. 10° 10' N., 540 m., climbing, fls. cream, Oct., No. 4454. Dubar, long. 45° 5' N., lat. 10° 20' E., 360 m., fls. white, handsome, Jan., No. 4774.

*Anthospermum muriculatum* Hochst. ex A. Rich.—F.T.A. 3 : 229.

ABYSSINIA : slopes of Sarerta Mt., long. 42° 19' E., lat. 9° 30' N., 2,400 m., in open grass, fls. greenish yellow, Feb., No. 5188.

*Rubia discolor* Turcz.—F.T.A. 3 : 244.

ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,890 m., on limestone, climbing, fls. greenish, Feb., No. 5005.

*Galium Aparine* Linn.—F.T.A. 3 : 245.

SOMALILAND : Sigib Mt., long. 43° 11' E., lat. 10° 19' N., 1,560 m., Feb., No. 4998.

*G. hamatum* Hochst. ex A. Rich. Tent. Fl. Abyss. 1 : 345 (1847).

ABYSSINIA : Kondudo Mt., long. 42° 20' E., lat. 9° 27' N., 2,640 m., on limestone slopes, rough herb, fls. greenish, Feb., No. 5214. Vernac.—*Lalesa*.—Endemic.

*G. spurium* Linn.—F.W.T.A. 2 : 137.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,280 m., by stream, fls. white, Feb., No. 5200.

#### DIPSACACEAE.

*Pterocephalus frutescens* Hochst. ex A. Rich. Fl. Abyss. 1 : 369 (1847). *Scabiosa frutescens* Hiern—F.T.A. 3 : 252.

ABYSSINIA : Mulkajibri, long. 42° 16' E., lat. 9° 24' N., 1,770 m., evergreen scrub formation, fls. pale pink, Feb., No. 5091. Vernac.—*Boko ta Hila*.

#### COMPOSITAE.

*Galinsoga parviflora* Cav. Ic. 3 : 41, t. 281 (1795).—F.W.T.A. 2 : 141.

ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,890 m., waste places, Feb., No. 5019.

*Guizotia Schimper* Sch. Bip.—F.T.A. 3 : 385.

ABYSSINIA : Gala Pass, long. 42° 19' E., lat. 9° 28' N., 2,250 m., Feb., No. 5121. Kondudo Mt., long. 42° 20' E., lat. 9° 27' N., 2,430 m., fls. yellow, Feb., No. 5229.—Also in Eritrea.

- Coreopsis macrantha* Sch. Bip.—F.T.A. 3: 391.  
 ABYSSINIA: Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,700 m., fls. yellow, Mar., No. 5301.—Endemic.
- Bidens pilosa* Linn.—F.T.A. 3: 392; F.W.T.A. 2: 143.  
 ABYSSINIA: Harar, long.  $42^{\circ} 6'$  E., lat.  $9^{\circ} 18'$  N., 1,860 m., on limestone, fls. yellow, Feb., No. 5002. Vernac.—*Jugogid*.
- Wedelia abyssinica* Vatke—F.T.A. 3: 377.  
 SOMALILAND: Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,290 m., herb 1 m., fls. yellow, Sept., No. 3920.
- Eclipta alba* (Linn.) Hassk.—F.T.A. 3: 373; F.W.T.A. 2: 146.  
 SOMALILAND: Buramo, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ}$  N., 1,260 m., herb 20 cm., fls. white, Jan., No. 4875.
- Spilanthes Acmella* Linn.—F.T.A. 3: 384; F.W.T.A. 2: 147.  
 ABYSSINIA: Galla Pass, long.  $42^{\circ} 19'$  E., lat.  $9^{\circ} 28'$  N., 2,280 m., prostrate, fls. yellow, Feb., No. 5197.
- Siegesbeckia abyssinica* Oliv. & Hiern—F.T.A. 3: 372.  
 ABYSSINIA: Geldid, long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 15'$  N., 2,430 m., herb 1 m., fls. yellow, Mar., No. 5381.
- Emilia sagittata* DC.—F.T.A. 3: 405; F.W.T.A. 2: 149.  
 ABYSSINIA: Harar, long.  $42^{\circ} 10'$  E., lat.  $9^{\circ} 20'$  N., 1,650 m., fls. purple, heads drooping, Feb., No. 5066.
- Notonia coccinea* Oliv. & Hiern—F.T.A. 3: 407.  
 ABYSSINIA: Jijiga-Harrar road, long.  $42^{\circ} 15'$  E., lat.  $9^{\circ} 15'$  N., 1,500 m., subsucculent, fls. scarlet, Feb., No. 5000.
- Cineraria abyssinica* Sch. Bip.—F.T.A. 3: 404.  
 ABYSSINIA: Harar, long.  $42^{\circ} 20'$  E., lat.  $9^{\circ} 27'$  N., 2,700 m., fls. yellow, Feb., No. 5210.
- C. Schimperii* Sch. Bip.—F.T.A. 3: 404.  
 ABYSSINIA: Harar, 1,890 m., fls. yellow, Feb., No. 5026.
- Senecio gigas* Vatke—F.T.A. 3: 418.  
 ABYSSINIA: Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,730 m., on limestone slopes, 2.5 m., fls. orange, Mar., No. 5359.—Endemic.
- S. longiflorus* (DC.) Oliv. & Hiern—F.T.A. 3: 421. *Kleinia longiflora* DC.  
 SOMALILAND: Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,350 m., on stony ground, stem succulent, fls. yellow, Oct., No. 4242. Ridge south east of Auboba, long.  $43^{\circ} 5'$  E., lat.  $9^{\circ} 59'$  N., on gneiss rocks, 1 m., fls. yellow, Nov., No. 4609.
- Var. *violacea* (A. Berg.) Hutch. & E. A. Bruce, var. comb. nov.  
*Kleinia violacea* A. Berg. *Senecio kleinoides* (Sch. Bip.) Oliv. & Hiern.  
 Ridge south east of Auboba, fls. purple, No. 4610. Vernac.—*Godor*; *wirib*.
- S. myriocephalus* Sch. Bip.—F.T.A. 3: 417.  
 ABYSSINIA: Galla Pass, long.  $42^{\circ} 19'$  E.,  $9^{\circ} 28'$  N., 2,400 m., in rank herbage up to *Podocarpus* forest, 1 m., fls. yellow, Feb., No. 5145. Vernac.—*Gawe*.—Endemic.

- S. nandensis* S. Moore in Journ. Linn. Soc. 35 : 360 (1902).  
 ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,520 m., climber, fls. cream, stem subsucculent, Feb., No. 5150.
- S. pendulus* (Forssk.) Sch. Bip. in Flora 28 : 500 (1845).  
 SOMALILAND : Hargeisa, long. 44° E., lat. 9° 35' N., 1,410 m., sandy soil, succulent, fls. scarlet, Oct., No. 4267.—Also in Arabia and Abyssinia.
- S. Schimperii* Sch. Bip.—F.T.A. 3 : 412.  
 ABYSSINIA : Harar, long. 42° 10' E., lat. 9° 20' N., 1,650 m., fls. yellow, Feb., No. 5048.—Also in Eritrea and Arabia.
- S. subscandens* Hochst. ex A. Rich.—F.T.A. 3 : 421.  
 SOMALILAND : Simodi, long. 43° 30' E., lat. 10° 5' N., 1,320 m., in *Buxus-Acokanthera* scrub, climber, fls. yellow, Nov., No. 4567. Vernac.—*Dalol Daiyer*.
- Euryops pinifolius* A. Rich.—F.T.A. 3 : 423.  
 SOMALILAND : Simodi, long. 43° 30' E., lat. 10° 5' N., 1,740 m., among rocks near Juniperus, 1.5 m., fls. yellow, Nov., No. 4577.
- Tripteris Vaillantii* Decne.—F.T.A. 3 : 424.  
 SOMALILAND : Jifa Uri, long. 43° 22' E., lat. 9° 42' N., 1,680 m., on gneiss kopje, 40 cm., fls. yellow, very aromatic, Jan., No. 4832.
- ABYSSINIA : Harar, long. 42° 10' E., lat. 9° 10' N., 1,620 m., Feb., No. 5055. Haramaia, long. 42° E., lat. 9° 24' N., 1,980 m., Mar., No. 5469.
- Cotula abyssinica* Sch. Bip.—F.T.A. 3 : 398.  
 ABYSSINIA : Gorla-Kolubi track, long. 41° 45' E., lat. 9° 22' N., 2,610 m., in grass land, fls. yellowish, Mar., No. 5400.
- Anthemis tigréensis* J. Gay ex A. Rich. Fl. Abyss. 418 (1847).  
 A. *Cotula Oliv. & Hiern*—F.T.A. 3 : 396, non Linn.
- ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 3,000 m., on limestone rocks, rays white, Mar., No. 5320.
- Artemisia abyssinica* Sch. Bip.—F.T.A. 3 : 400.  
 ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,280 m., fls. straw-coloured, very aromatic, Feb., No. 5196. Vernac.—*Jukun*.—Endemic.
- Aster ericifolius* Forssk. Fl. Aegypt-Arab. 1 : 50 (1775).  
 SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m.; rays bluish, Sept. No. 3974. Vernac.—*Barkwa allele*.—Also in Arabia and Abyssinia.
- Conyza aegyptiaca* Ait.—F.T.A. 3 : 314 ; F.W.T.A. 2 : 154.  
 SOMALILAND : Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., fls. yellow, Oct., No. 4130.
- C. Hochstetteri* Sch. Bip.—F.T.A. 3 : 312.  
 ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,890 m., fls. pale yellow, Feb., No. 5018.
- C. pectinata* Sch. Bip.—F.T.A. 3 : 315.  
 ABYSSINIA : Mulkajibri, long. 42° 16' E., lat. 9° 24' N., 1,770 m., fls. pale yellow, Feb., No. 5089.—Endemic.

- C. pyrrhopappa* Sch. Bip.—F.T.A. 3 : 318.  
 ABYSSINIA : Harar, long. 42° 10' E., lat. 9° 20' N., 1,740 m.,  
 fls. pale yellow, Feb., No. 5039.
- C. stricta* Willd.—F.T.A. 3 : 318.  
 SOMALILAND : Simodi, long. 43° 30' E., lat. 10° 5' N., 1,740 m.,  
 among rocks on mountain top, 1 m., fls. yellow, Nov., No. 4579.
- Dichrocephala integrifolia* (Ait.) O. Kze Rev. Gen. Plant. 1 : 333  
 (1891).  
 ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,830 m.,  
 fls. green, Feb., No. 5001.
- Athrixia rosmarinifolia* Oliv. & Hiern—F.T.A. 3 : 355.  
 ABYSSINIA : Gafra valley, long. 41° 48' E., lat. 9° 12' N., 2,700 m.,  
 in *Juniperus-Podocarpus* forest, rays mauve, Mar., No. 5347.
- Tarchonanthus camphoratus* Linn.—F.T.A. 3 : 321.  
 SOMALILAND : Afard, long. 44° 8' E., lat. 10° 8' N., 1,170 m.,  
 in *Buxus* scrub, shrub 2 m., Oct., No. 4468. Vernac.—*Adadi*.
- Psiadia arabica* Jaub. & Spach.—F.T.A. 3 : 319.  
 SOMALILAND : Duwi, long. 4° 15' E., lat. 10° 5' N., 1,200 m.,  
 in *Buxus* scrub, shrub 1 m., fls. yellow, Oct., No. 4425. Vernac.—  
*Midir Guni*.
- P. incana* Oliv. & Hiern—F.T.A. 3 : 320.  
 SOMALILAND : Boundary Pillar 99, long. 44° 39' E., lat. 8° 47' N.,  
 1,140 m., fls. white, Oct., No. 4140. Jalelo, long. 44° 14' E., lat.  
 9° 45' N., 1,080 m., on schist rocks, shrublet 0.5 m., fls. white, Oct.,  
 No. 4294. Vernac.—*Daiya*.—Endemic.
- Iphiona rotundifolia* Oliv. & Hiern—F.T.A. 3 : 360.  
 SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N.,  
 990 m., small shrub, fls. white, Oct., No. 4200. Duwi, long. 44°  
 8' E., lat. 10° 10' N., 510 m., on sand, shrublet 0.5 m., fls. purple,  
 Oct., No. 4432. Vernac.—*Gegabot*.—Endemic.
- I. scabra* DC.—F.T.A. 3 : 360.  
 ADEN : on lava slopes, 0.7 m., fls. yellow, Mar., No. 5494.—Also  
 in Egypt and Arabia.
- Phagnalon hypoleucum* Sch. Bip.—F.T.A. 3 : 338.  
 ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,460 m.  
 fls. dingy yellow, Feb., No. 5154.—Endemic.
- Nidorella pedunculata* Oliv. in James Unknown Horn of Africa  
 319 (1888).  
 SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m.,  
 fls. yellow, Sept., No. 4061. Jifa Uri, long. 43° 22' E., lat. 9° 42' N.,  
 1,680 m., stems prostrate, fls. yellow, Jan., No. 4834. Vernac.—  
*Adan yale*.—Endemic.
- Microglossa Elliotii* S. Moore in Journ. Linn. Soc. 35 : 327 (1902).  
 ABYSSINIA : Gara Mulata Mt., long. 41° 48' E., lat. 9° 12' N.,  
 2,400–2,850 m., on limestone slopes, 2 m., fls. yellow, Mar., No. 5284.
- Pulicaria Aylmeri* Baker in Kew Bull. 1895 : 216.  
 SOMALILAND : Berbera, near the sea, 0.5 m., fls. yellow, Jan.,  
 No. 4748.—Endemic.

*P. petiolaris* Jaub. & Spach—F.T.A. 3 : 364.  
SOMALILAND : Burmado, long. 43° 50' E., lat. 10° 13' N., 980 m., in shade of boulders, 0.7 m., fls. yellow, Nov., No. 4540.

*P. somalensis* O. Hoffm. in Engl. Bot. Jahrb. 38 : 203 (1906).

SOMALILAND : Marinar Range, long. 42° 47' E., lat. 10° 29' N., 1,050 m., 0.5 m., fls. yellow, fragrant and viscous, Nov., No. 4656.  
Vernac.—*Adar* ; *Audidowa*.—Endemic.

*Imula confertiflora* A. Rich.—F.T.A. 3 : 358.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,460 m., on limestone, 1.5 m., fls. yellow, Feb., No. 5155.—Endemic.

*Pluchea Dioscoridis* DC.—F.T.A. 3 : 329.

SOMALILAND : Gorfulai, long. 43° 38' E., lat. 10° 16' N., 510 m., shrub 1.2 m., fls. white, Nov., No. 4555. Satoa, long. 43° 5' E., lat. 9° 59' N., 1,500 m., shrub 1 m., fls. white, Nov., No. 4615.  
Vernac.—*Bi-es*.

*P. ovalis* DC.—F.T.A. 3 : 328 ; F.W.T.A. 2 : 157.

SOMALILAND : Bir Dai, long. 44° 17' E., lat. 9° 55' N., 900 m., in water, shrub 2 m., fls. cream, Oct., No. 4337.

*P. sarcophylla* Chiov. Fl. Somala 198 (1929).

SOMALILAND : Las dawan, long. 45° 12' E., lat. 10° 20' N., 180 m., 30 cm., fls. purple, leaves succulent, Jan., No. 4805.—Endemic.

*Blumea Bovei* (DC.) Vatke in Oesterr. Bot. Zeitschr. 1875 : 324.  
*B. abyssinica* Sch. Bip. ex A. Rich.—F.T.A. 3 : 323.

SOMALILAND : Debrawen, long. 42° 49' E., lat. 10° 26' N., 920 m., in marshy places, fls. lilac, Nov., No. 4647. Vernac.—*Bi-es*.

*B. lacera* DC.—F.T.A. 3 : 322 ; F.W.T.A. 2 : 158.

ABYSSINIA : Boesesa valley, long. 42° 18' E., lat. 9° 29' N., 1,950 m., fls. purplish, Feb., No. 5170.

*Pegolettia senegalensis* Cass.—F.T.A. 3 : 361 ; F.W.T.A. 2 : 158.

SOMALILAND : Hargeisa, long. 44° E., lat. 9° 35' N., 1,410 m., sandy soil, fls. yellow, viscid, Oct., No. 4265.

*Laggera pterodonta* Sch. Bip.—F.T.A. 3 : 324 ; F.W.T.A. 2 : 158.

ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,920 m., on limestone, 0.5 m., fls. purple, viscid and aromatic, Feb., No. 5023.

*L. tomentosa* Sch. Bip.—F.T.A. 3 : 325.

ABYSSINIA : Gafra Valley, long. 42° 19' E., lat. 9° 28' N., 2,250 m., Feb., No. 5167. Vernac.—*Kaskas*.

*Helichrysum abyssinicum* Sch. Bip.—F.T.A. 3 : 351.

ABYSSINIA : Kondudo Mt., long. 42° 20' E., lat. 9° 27' N., 2,610–2,790 m., on limestone slopes, 0.3 m., fls. yellow, Feb., No. 5205.

*H. globosum* Sch. Bip.—F.T.A. 3 : 354 ; F.W.T.A. 2 : 159.

ABYSSINIA : Gara mulata Mt., long. 41° 45' E., lat. 9° 15' N., 2,490 m., on denuded limestone slopes, fls. yellow, Mar., No. 5377. Yuka, long. 41° 40' E., lat. 9° 25' N., 2,190 m., Mar., No. 5427.

*H. glumaceum* DC. Prod. 6 : 197 (1837).

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 35' N., 1,380 m., fls. white, Sept., No. 4034. Vernac.—*Majino*.

- H. Hochstetteri* Hook. f. in Journ. Linn. Soc. 6 : 13 (1862).  
 ABYSSINIA : Geldid, long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 15'$  N., 2,400 m.,  
 fls. bright yellow, Mar., No. 5387. Vernac.—*Najilo*.
- H. Schimperii* Moeser in Engl. Bot. Jahrb. 44 : 244 (1910).  
 ABYSSINIA : Geldid, fls. pale yellow, Mar., No. 5388.
- H. Traversii* Chiov. in Ann. Bot. Roma 9 : 72 (1911).  
 ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N.,  
 2,880 m., fls. dull yellow, Mar., No. 5321.—Endemic.
- Gnaphalium Unionis* Sch. Bip.—F.T.A. 3 : 343.  
 ABYSSINIA : Galla Pass, long.  $42^{\circ} 19'$  E., lat.  $9^{\circ} 28'$  N., 2,040–  
 2,340 m., white, Feb., No. 5108.
- Sphaeranthus suaveolens* DC.—F.T.A. 3 : 333.  
 ABYSSINIA : Harar, long.  $42^{\circ} 10'$  E., lat.  $9^{\circ} 20'$  N., 1,740 m.,  
 in stream, fls. purple, Feb., No. 5033. Vernac.—*Ala shien*.
- Blepharispermum fruticosum* Klatt & Schinz in Bull. Herb.  
 Boiss. 3 : 429 (1895).  
 SOMALILAND : Boundary, long.  $45^{\circ} 9'$  E.,  $8^{\circ} 37'$  N., 990 m.,  
 shrub 1 m., fls. cream, Oct., No. 4158. Vernac.—*Gehait*.—Endemic.
- Vernonia amplexicaulis* Baker in Kew Bull. 1895 : 216.  
 SOMALILAND : Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,290 m.,  
 1 m., fls. mauve, Sept., No. 3908. Vernac.—*Fodadeh*.
- V. amygdalina* Del.—F.T.A. 3 : 284 ; F.W.T.A. 2 : 169.  
 ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 45'$  E., lat.  $9^{\circ} 15'$  N.,  
 2,460 m., slender tree 5 m., fls. pale mauve, Mar., No. 5378.  
 Vernac.—*Dumoga*.
- V. atriplicifolia* Jaub. & Spach—F.T.A. 3 : 270.  
 ADEN : 150 m., on lava, fls. purple, 22 Mar., No. 5521.
- V. cinerascens* Sch. Bip.—F.T.A. 3 : 275.  
 SOMALILAND : Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,290 m.,  
 shrub 0.5 m., Sept., No. 4000. Vernac.—*Hil*.
- V. Hochstetteri* Sch. Bip.—F.T.A. 3 : 287.  
 ABYSSINIA : Geldid, long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 15'$  N., 2,400 m.,  
 1.5 m., fls. mauve, Mar., No. 5390.—Endemic.
- V. Leopoldii* Vatke—F.T.A. 3 : 277.  
 ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N.,  
 2,700 m., in *Podocarpus-Juniperus* forest, fls. purple, Mar., No.  
 5346.—Also in Eritrea.
- V. podocoma* Sch. Bip.—F.T.A. 3 : 296.  
 ABYSSINIA : Harar, long.  $42^{\circ} 6'$  E., lat.  $9^{\circ} 18'$  N., 1,920 m., on  
 limestone, shrub 2 m., fls. mauve, Feb., No. 5004.
- Triplotaxis somalensis* (O. Hoffm.) Hutch. in Kew Bull. 1914 : 355.  
 SOMALILAND : Boundary 7 miles west of long.  $44^{\circ}$  E., and lat.  
 $9^{\circ}$  N., about 1,350 m., in Acacia-grass country, fls. purplish blue,  
 Oct., No. 4224.—Endemic.
- Ageratum conyzoides* Linn.—F.T.A. 3 : 300 ; F.W.T.A. 2 : 127.  
 ABYSSINIA : Mulkajibri, long.  $42^{\circ} 16'$  E., lat.  $9^{\circ} 24'$  N., 1,620 m.,  
 by stream, fls. pale blue, Feb., No. 5081.

*Dicoma somalensis* S. Moore in Journ. Bot. 1899 : 60.  
SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., shrub 0.5 m., fls. white, Sept., No. 4002. Auboba, long. 43° E., lat. 10° 6' N., 1,620 m., fls. white, Nov., No. 4620. Vernac.—*Ma-adadi*.—Endemic.

*Hochstetteria Schimper* DC.—F.T.A. 3 : 444.

ADEN : About 300 m., on lava, fls. white, Mar., No. 5510.

*Gerbera piloselloides* Cass.—F.T.A. 3 : 445 ; F.W.T.A. 2 : 174.

ABYSSINIA : Gara mulata Mt., long. 41° 33' E., lat. 9° 12' N., 2,700–3,090 m., rays dark crimson, Mar., No. 5323.

*Flaveria australasica* Hook. in Mitch. Journ. Trop. Austral. 118 (1848).

SOMALILAND : Gorfulai, long. 43° 38' E., lat. 10° 16' N., 480 m., by water, fls. yellow, Nov., No. 4552.

*Landtia Ruppellii* Benth. & Hook. f.—F.T.A. 3 : 426.

ABYSSINIA : Slopes of Sarerta Mt., long. 42° 19' E., lat. 9° 30' N., 2,400 m., fls. yellow, Feb., No. 5186.

*L. Schimper* Benth. & Hook. f.—F.T.A. 3 : 426.

ABYSSINIA : Gorla, long. 41° 48' E., lat. 9° 20' N., 2,700 m., fls. yellow, Mar., No. 5395.

*Echinops Ellenbeckii* O. Hoffm. in Engl. Bot. Jahrb. 38 : 208 (1906).

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,340 m., on limestone, 3 m., fls. red, Feb., No. 5123. Vernac.—*Kusheshila*.—Endemic.

*E. macrochaetus* Fres.—F.T.A. 3 : 432.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,400 m., on limestone, 0.8 m., fls. pale blue, Feb., No. 5140.—Also in Eritrea.

*E. spinosus* Linn.—F.T.A. 3 : 431.

ABYSSINIA : Mulkajibri, long. 42° 17' E., lat. 9° 26' N., 1,890 m., waste places in lower evergreen formation, fls. pale blue, spines of inflorescence straw-coloured, Feb., No. 5095. Vernac.—*Kosheshila*.

*Cirsium vulgare* (Savi) Airy-Shaw in Fedde Repert. 43 : 304 (1938).

ABYSSINIA : Kofajalo, long. 41° 51' E., lat. 9° 9' N., 2,130 m., fls. purple, Mar., No. 5274.

*Carduus leptacanthus* Fres.—F.T.A. 3 : 433.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,100 m., 1 m., fls. purple, Feb., No. 5110.

*Jurinea monocephala* Aitch. & Hemsl. in Trans. Linn. Soc. ser. 2, 3 : 80 (1886).

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 35' N., 1,440 m., in denuded areas, fls. purple, leaves white, Sept., No. 4028.

Distrib.—Also in Afghanistan, at Khorasan, 1,500 m.—This is an interesting new record and adds another genus to the flora of tropical Africa.

*Lactuca capensis* Thunb.—F.T.A. 3 : 452 ; F.W.T.A. 2 : 177.

ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,890 m., on limestone, fls. pale blue, Feb., No. 5017. Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,340 m., 1 m., fls. violet, Feb., No. 5122.

*L. goraeënsis* Sch. Bip.—F.T.A. 3 : 452 ; F.W.T.A. 2 : 177.  
SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m.,  
fls. yellow, Sept., No. 3966. Vernac.—*Burdeh*.

*Crepis Rueppellii* Sch. Bip.—F.T.A. 3 : 450.

ABYSSINIA : Harar, 1,920 m., on limestone, fls. yellow, Feb.,  
No. 5020.

*Sonchus Bipontinii* Aschers.—F.T.A. 3 : 458.

ABYSSINIA : Harar, 1,920 m., fls. yellow, Feb., No. 5021. Galla  
Pass, long. 42° 19' E., lat. 9° 28' N., 2,280 m., by stream, 2 m.,  
fls. yellow, Feb., No. 5199.

#### GENTIANACEAE.

*Swertia Quartiniiana* A. Rich.—F.T.A. 4, 1 : 574.

ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N.,  
2,820 m., Mar., No. 5311b.—Also in Kenya.

*S. Schimperii* Griseb.—F.T.A. 4, 1 : 573.

ABYSSINIA : Gara mulata Mt., 2,820 m., damp limestone rocks,  
Mar., No. 5311a.

#### PRIMULACEAE.

*Anagallis arvensis* Linn.—F.T.A. 3 : 490.

ABYSSINIA : Geldid, long. 41° 48' E., lat. 9° 15' N., 2,430 m.,  
on muddy stream bank, fls. blue, Mar., No. 5379.

*A. serpens* Hochst. ex DC. Prod. 8 : 668 (1844).

ABYSSINIA : Gara mulata Mt., long. 41° 45' E., lat. 9° 15' N.,  
3,060 m., by water, prostrate, fls. pink, Mar., No. 5366.

*Lysimachia africana* Engl. in Abh. Preuss. Akad. Wiss. 1894 :  
55 and 59.

ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N.,  
2,820 m., fls. purplish, Mar., No. 5351.

*Primula verticillata* Forssk. var. *simensis* Hook. f.—F.T.A. 3 :  
488.

ABYSSINIA : Gara mulata Mt., 2,790 m., upper evergreen forest,  
leaves nearly white, fls. yellow, Mar., No. 5334.

#### PLUMBAGINACEAE.

*Ceratostigma speciosum* Prain in Journ. Bot. 44 : 8 (1906).

SOMALILAND : Abasa, long. 43° 4' E., lat. 10° 6' N., 1,470 m.,  
on gneiss slopes, 40 cm., fls. sky blue, Dec., No. 4716. Vernac.—  
*Elandabera*.

*C. abyssinicum* Aschers.—F.T.A. 3 : 487.

ABYSSINIA : Kofajalo, long. 41° 51' E., lat. 9° 9' N., 2,310 m.,  
near stream, 1 m., fls. pale blue, Mar., No. 5282.

*Limonium axillare* (Forssk.) O. Kuntze Rev. Gen. 395 (1891).  
*Statice axillaris* Forssk.

ADEN : 210–510 m., lava slopes in subdesert, tufted, fls. purple,  
Mar., No. 5475.



*L. xipholepis* (Baker) Hutch. & E. A. Bruce, comb. nov. *Statice xipholepis* Baker.

SOMALILAND: Dubriat Mt., long.  $45^{\circ} 10' E.$ , lat.  $10^{\circ} 22' N.$ , about 300 m., in open scrub, leaves white, fls. crimson, Jan., No. 4784.—Endemic.

*L. somalorum* (Vierh.) Hutch. & E. A. Bruce, comb. nov. *Statice somalorum* Vierh.

SOMALILAND: Las Dawan, long.  $45^{\circ} 12' E.$ , lat.  $10^{\circ} 20' N.$ , 1,800 m., small shrub 40 cm., fls. pink, Jan., No. 4806. Vernac.—*Dumbaiyod*.—Endemic.

*Plumbago zeylanica* Linn.—F.T.A. 3: 486.

SOMALILAND: Simodi, long.  $43^{\circ} 30' E.$ , lat.  $10^{\circ} 5' N.$ , 1,200 m., in open wood, fls. white, Nov., No. 4565. ABYSSINIA: Harar, long.  $42^{\circ} 10' E.$ , lat.  $9^{\circ} 20' N.$ , 1,740 m., on granite, Feb., No. 5038. Vernac.—*Elkus* (Somali); *Martus* (Abyss.).

#### PLANTAGINACEAE.

*Plantago lanceolata* Linn.—F.T.A. 5: 502.

ABYSSINIA: Harar, long.  $42^{\circ} 6' E.$ , lat.  $9^{\circ} 18' N.$ , 1,590 m., Feb., No. 5015.

#### CAMPANULACEAE.

*Campanula Quartiniana* A. Rich.—F.T.A. 3: 481.

ABYSSINIA: Kondudo Mt., long.  $42^{\circ} 20' E.$ , lat.  $9^{\circ} 27' N.$ , 2,640 m., on mountain slopes, trailing herb, fls. blue, Feb., No. 5211.—Also in Eritrea.

*Lightfootia abyssinica* Hochst. ex A. Rich.—F.T.A. 3: 474.

ABYSSINIA: Harar, long.  $42^{\circ} 10' E.$ , lat.  $9^{\circ} 40' N.$ , 1,740 m., open grass, fls. blue, Feb., No. 5041.

*Wahlenbergia silenoides* Hochst. ex A. Rich.—F.T.A. 3: 478.

ABYSSINIA: Galla Pass, long.  $42^{\circ} 19' E.$ , lat.  $9^{\circ} 28' N.$ , 2,400 m., in open grass, fls. pale lilac, Feb., No. 5161.—Also in Uganda.

#### LOBELIACEAE.

*Lobelia Rhynchoptalam* Hemsl.—F.T.A. 3: 465.

ABYSSINIA: Gara mulata Mt., long.  $41^{\circ} 48' E.$ , lat.  $9^{\circ} 12' N.$ , 2,790–3,210 m., in Erica formation, 5 m., fls. bluish green, Mar., No. 5317. Vernac.—*Gaboia*.

*L. stellarioides* (Presl) Benth. & Hook. f. ex Hemsl.—F.T.A. 3: 470.

ABYSSINIA: Gorla-Kolubi track, long.  $41^{\circ} 45' E.$ , lat.  $9^{\circ} 22' N.$ , 2,610 m., open grassland, fls. yellow, then blue, Mar., No. 5401.

*L. fervens* Thunb.—F.T.A. 3: 468.

ABYSSINIA: Kofajalo, long.  $41^{\circ} 51' E.$ , lat.  $9^{\circ} 9' N.$ , 2,280 m., marshy places, fls. pale blue, Mar., No. 5279.

#### BORAGINACEAE.

*Ehretia abyssinica* R. Br.—F.T.A. 4, 2: 23.

ABYSSINIA: Harar, long.  $42^{\circ} 10' E.$ , lat.  $9^{\circ} 20' N.$ , 1,650 m., small tree 3–4 m., fls. white tinged with lilac, Feb., No. 5051. Vernac.—*Garmi*.—Also in Eritrea.

*E. Braunii* Vatke—F.T.A. 4, 2 : 23.

SOMALILAND : Deriodera, long.  $42^{\circ} 55'$  E., lat.  $10^{\circ} 3'$  N., 1,170 m., shrub 3 m., fls. lilac, Nov., No. 4644. Vernac.—*Mared Deol*.

*E. obtusifolia* Hochst. ex DC.—F.T.A. 4, 2 : 25.

SOMALILAND : Hargeisa, long.  $44^{\circ}$  E., lat.  $9^{\circ} 33'$  N., 1,290 m., 2 m., berries edible, Sept., No. 4045. Buramo-Dumuk tug, long.  $43^{\circ} 12'$  E., lat.  $10^{\circ} 1'$  N., 1,200 m., shrub 3 m., fls. white tinged with blue, berries edible, Jan., No. 4886. Vernac.—*Mared Deol*.

*Ehretia orbicularis* Hutch. et E. A. Bruce, sp. nov. affinis *E. obtusifoliae* Hochst. ex DC., sed foliis orbicularibus minoribus, cymis paucifloris differt.

Frutex ad 3 m. altus; rami cinereo-purpurei, circiter 4 mm. crassi, adpresse pubescentes demum glabrescentes, ramulis lateralibus brevissimis ad 1.5 cm. longis molliter tomentosis. Folia ad apices ramulorum aggregata, parva, orbicularia, late emarginata, 1.5–2 cm. diametro, integra, utrinque scabrida et glandulosa, nervis lateralibus circiter 4 inconspicuis flexuosis marginem versus evanidis; petioli 4–5 mm. longi, molliter pubescentes. Cymae extra-axillares, pauciflorae; pedunculi ad 1 cm. longi cum pedicellis 4–5 mm. longis molliter pubescentes. Calyx campanulatus, extra pubescens, tubo 2 mm. longo, lobis triangulari-ovatis acutis 2.5 mm. longis. Corolla campanulata, pallide cremea, tubo 4 mm. longo glabro, lobis late ovatis subacutis extra minute glandulosis. Stamina infra apicem corollae tubi inserta; antherae 2 mm. longae. Ovarium ovoideum, glabrum, 1.5 mm. longum; stylus 2.5 mm. longus, breviter bilobus, stigmatibus reniformibus. Fructus ovoideo-globosus, 5 mm. diametro, glaber.

SOMALILAND : Boundary Pillar 93, long.  $45^{\circ} 9'$  E., lat.  $8^{\circ} 37'$  N., 900 m., shrub 2 m., 5 Oct., No. 4168. Afard, long.  $48^{\circ} 8'$  E., lat.  $10^{\circ} 10'$  N., 690 m., shrub 3 m., fls. pale cream, 26 Oct., No. 4472 (type in Kew Herb.). Vernac.—*Himir*.

*Cordia Gharaf* Ehrenb. ex Aschers. in Sitzungsber. Naturf. Fer. Berl. 1879 : 46. *C. Rothii* Roem. & Schult.—F.T.A. 4, 2 : 18.

SOMALILAND : Afard, long.  $44^{\circ} 8'$  E., lat.  $10^{\circ} 10'$  N., 690 m., shrub 2 m., Oct., No. 4445. Vernac.—*Mared*. Wood used for making fire by friction. Boundary Pillar 93, long.  $45^{\circ} 9'$  E., lat.  $8^{\circ} 37'$  N., 990 m., 6 Oct., No. 4191.

*C. ovalis* R. Br.—F.T.A. 4, 2 : 15.

SOMALILAND : Daraweina, long.  $48^{\circ} 8'$  E., lat.  $9^{\circ} 40'$  N., 1,230 m., shrub 4 m., fr. Oct., No. 4280. Hargeisa, long.  $44^{\circ}$  E., lat.  $9^{\circ} 35'$  N., 1,410 m., shrub 3 m., fruit edible and very pleasant, Oct., No. 4262 Vernac.—*Mared*.

*Heliotropium abyssinicum* Vatke—F.T.A. 4, 2 : 41.

SOMALILAND : Dubriat Mt., long.  $45^{\circ} 10'$  E., lat.  $10^{\circ} 22'$  N., 210 m., shrublet 40 cm., fls. dull yellow, Jan., No. 4791.—Also in Eritrea.

*H. cinerascens* Steud. ex DC.—F.T.A. 4, 2 : 39.

ABYSSINIA : Harar, long.  $42^{\circ} 10'$  E., lat.  $9^{\circ} 20'$  N., 1,650 m., 0.5 m., fls. white, Feb., No. 5064. Vernac.—*Baganapsi*.

*H. pterocarpum* DC.—F.T.A. 4, 2 : 35.

SOMALILAND : Berbera, fls. white, Jan., No. 4740. Vernac.—*Gahod*.

*Heliotropium sessilistigma* Hutch. et E. A. Bruce, sp. nov., ob stigma sessile globosum valde distincta.

Suffrutex e basi lignosa dense ramosus, ubique dense adpresse albido-pilosus. *Folia* conferta, subsessilia, ovato-lanceolata, subacuta, circiter 4 mm. longa et 2 mm. lata marginibus recurvatis. *Flores* albi, ad apices ramulorum dense glomerati, sessiles. *Calycis lobi* lanceolati, acuti, circiter 2mm. longi, setoso-pilosi. *Corolla* calycem paullo superans; tubus cylindricus, extra parce pubescens, intra glaber, 1 mm. longus; lobi triangulari-lanceolati, acuti, extra dense pilosi, basi intra dense setosi. *Antherae* leviter supra medium corollae tubi insertae, lineari-lanceolatae, 0.5 mm. longae. *Ovarium* globosum, 0.5 mm. diametro, glabrum, stigmatibus globosis sessilibus coronatum.

SOMALILAND : Boundary, long. 44° 15' E., lat. 8° 58' N., 1,260 m., fls. white, 30 Sept., No. 4107 (type in Kew Herb.). Vernac.—*Gahot*.

*H. strigosum* Willd.—F.T.A. 4, 2 : 41.

SOMALILAND : Afard, long. 44° 8' E., lat. 10° 10' N., 690 m., 0.3 m., fls. white, Oct., No. 4444. Marmar Range, long. 42° 47' E., lat. 10° 29' N., 1,050 m., fls. white, Nov., No. 4655. Vernac.—*Maragh fof*; *Ged ambar*.

*H. supinum* L.—F.T.A. 4, 2 : 37.

SOMALILAND : Buramo, long. 43° 10' E., lat. 10° N., 1,410 m., fls. white, Jan., No. 4856. Vernac.—*Gahod*.

*H. undulatifolium* Turill in Kew Bull. 1915 : 76.

SOMALILAND : Hargeisa, long. 44° E., lat. 9° 33' N., 1,290 m., fls. white, Sept., No. 3968.

*H. undulatum* Vahl—F.T.A. 4, 2 : 37.

SOMALILAND : Biji, long. 44° 5' E., lat. 10° 12' N., 510 m., 30 cm., fls. white, Oct., No. 4508. Vernac.—*Forda ada*.

*H. zeylanicum* Lam.—F.T.A. 4, 2 : 31.

SOMALILAND : Hargeisa, 1,290 m., fls. greenish, Oct., No. 3960. Vernac.—*Gahoub*.

*Trichodesma calathiforme* Hochst.—F.T.A. 4, 2 : 49.

SOMALILAND : Burmado, long. 43° 50' E., lat. 10° 13' N., 960 m., fls. blue with brown eye, Nov., No. 4541. Ali Wein Mt., long. 45° 15' E., lat. 10° 24' N., 300 m., Jan., No. 4824. Vernac.—*Gahod*.

*Vaupelia heliocharis* (S. Moore) Brand in Fedde Repert. 13 : 83 (1914). *Trichodesma heliocharis* S. Moore—F.T.A. 4, 2 : 45.

SOMALILAND : Hargeisa, long. 44° E., lat. 9° 35' N., 1,410 m., fls. very pale blue, eaten by stock, Sept., No. 4031. Vernac.—*Aden yale*.—Endemic.

*Cynoglossum coeruleum* Hochst. ex DC.—F.T.A. 4, 2 : 53.

ABYSSINIA : Gara mulata Mt., long. 41° 45' E., lat. 9° 15' N., 3,180 m., fls. bright blue, Mar., No. 5368.

- C. lanceolatum* Forssk.—F.T.A. 4, 2 : 54.  
 ABYSSINIA : Harar, long. 42° 10' E., lat. 9° 20' N., 1,650 m.,  
 fls. white, Feb., No. 5063.  
*C. densifoliatum* Chiov. in Ann. Bot. Rom. 9 : 82 (1911).  
 ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,490 m.,  
 fls. bright blue, Feb., No. 5160.—Endemic.  
*Sericostoma albidum* Franch.—F.T.A. 4, 2 : 57.  
 SOMALILAND : Hargeisa, long. 44° 35' N., 1,440 m., fls. cream,  
 24 Sept., No. 4026. Afard, long. 44° 8' E., lat. 10° 10' N., 600 m.,  
 fls. white, Oct., No. 4448. Dobo Pass, long. 43° 15' E., lat. 10°  
 15' N., 1,200 m., Feb., No. 4959. Vernac.—*Hadu*.—Also in Socotra.  
*Lithospermum officinale* L.—F.T.A. 4, 2 : 59.  
 ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N.,  
 2,700 m., fls. cream, Mar., No. 5303.  
*Echiochilon fruticosum* Desf.—F.T.A. 4, 2 : 61.  
 SOMALILAND : Dubriat Mt., long. 45° 10' E., lat. 10° 22' N.,  
 150 m., fls. pale blue, Jan., No. 4776.  
*E. longiflorum* Benth. in Hook. Ic. Pl. t. 1277 (1879).  
 SOMALILAND : Dubriat Mt., long. 45° 10' E., lat. 10° 22' N.,  
 210 m., pale lilac, Jan., No. 4787.—Also in Arabia.

#### SOLANACEAE.

- Datura Metel* Linn.—F.T.A. 4, 2 : 256 ; F.W.T.A. 2 : 202.  
 SOMALILAND : Durdur, long. 43° 30' E., lat. 10° 10' N., 660 m.,  
 fls. white, Nov., No. 4582. Vernac.—*Boa medu*.  
*Discopodium penninervium* Hochst.—F.T.A. 4, 2 : 253 ;  
 F.W.T.A. 2 : 205, fig. 248.  
 ABYSSINIA : Galla Pass, No. 5125.  
*Lycium europaeum* Linn. Sp. Pl. 192 (1753). *L. persicum*  
 Miers—F.T.A. 4, 2 : 254.  
 SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N.,  
 990 m., bush 1 m., fls. white or bluish, Oct., No. 4154. Jebel Wotni  
 Mt., long. 45° 6' E., lat. 10° 18' N., 390 m., shrub 1.5 m., corolla  
 tube pale lilac, limb bright blue, Jan., No. 4798. Boundary : long.  
 44° 15' E., lat. 8° 55' N., 1,260 m., 0.2 m., fls. white, Sept., No. 4075.  
 Aden : 150–450 m., 1 m., fls. blue, Mar., No. 5495. Vernac.—  
*Surut* ; *Ausug*.  
*Withania somnifera* Dun.—F.T.A. 4, 2 : 249.  
 SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m.,  
 fls. greenish yellow, Sept., No. 3965. Daba Bur, long. 43° 6' E.,  
 lat. 9° 59' N., 1,470 m., shrub 1 m., fls. green, Nov., No. 4604.  
 Vernac.—*Gutitu* ; *Shuna shuna*.  
*Solanum adoense* Hochst.—F.T.A. 4, 2 : 233.  
 ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N.,  
 2,730 m., 1 m., fls. very pale blue, fruit orange, Mar., No. 5357.  
*S. campylacanthum* Hochst.—F.T.A. 4, 2 : 239.  
 ABYSSINIA : Mulkajibri, long. 42° 16' E., lat. 9° 24' N., 1,770 m.,  
 1 m., fls. purple, fruit yellow, Feb., No. 5087. Vernac.—*Omboi*.

*S. carense* Dunal—F.T.A. 4, 2 : 219.

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,410 m., shrublet 0.5 m., fls. blue, berries poisonous to man, Sept., No. 3901. Vernac.—*Karil*.

*S. dubium* Fres.—F.T.A. 4, 2 : 235.

SOMALILAND : Hargeisa, 1,290 m., 0.25 m., fls. blue, Sept., No. 3964. Vernac.—*Mor*.

*Solanum Gillettii* Hutch. et E. A. Bruce, sp. nov., affinis *S. cynanchoidi* Chiov. sed ubique densius stellato-tomentosa, aculeis majoribus recurvatis, petiolis brevioribus differt.

Frutex ad 1.5 m. altus; rami aculeati, tomentosi, aculeis recurvatis circiter 8 mm. longis dimidiis inferioribus tomentosis. *Folia* ovata, margine undulata, breviter et late acuminata, basi subrotundata, 4-5 cm. longa, 3-3.5 cm. lata, utrinque stellato-tomentosa; costa media infra aculeis 2-3 armata; nervi laterales utrinsecus 4-5; petioli circiter 3 mm. longi. *Cymae* subsessiles, pauciflorae; pedicelli circiter 1 cm. longi, tomentosi. *Calyx* vix 1 cm. longus, extra tenuiter tomentosus, lobis 5 triangulari-lanceolatis tubo aequilongis. *Corolla* 2 cm. longa, profunde lobata, lobis lineari-lanceolatis mucronatis utrinque stellato-pubescentibus. *Antherae* exsertae, 8-10 mm. longae. *Stylus* antheris longior, basin versus pubescens.

ABYSSINIA : Harar-Gobelli road, long.  $42^{\circ} 1' E.$ , lat.  $9^{\circ} 12' N.$ , 1,740 m., 1.5 m., fls. purple, fruit yellow, 1 Mar., No. 5255 (type in Kew Herb.). Vernac.—*Omboi*.

*S. gracilipes* Decne.—F.T.A. 4, 2 : 228.

SOMALILAND : Buramo, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} N.$ , 1,260 m., fls. purplish-blue, subscaudent, Jan., No. 4877.

ABYSSINIA : long.  $42^{\circ} 19' E.$ , lat.  $9^{\circ} 28' N.$ , 2,400 m., fls. white, Feb., No. 5149.—Also in Socotra and east to India.

*S. hastifolium* Hochst. ex Dunal—F.T.A. 4, 2 : 226.

SOMALILAND : Dobo Pass, long.  $43^{\circ} 15' E.$ , lat.  $10^{\circ} 15' N.$ , 1,140 m., climber 2 m., fls. blue, Feb., No. 4954.

*S. incanum* Linn.—F.T.A. 4, 2 : 238.

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., shrub 2 m., fls. blue, Sept., No. 3931. Boundary, long.  $44^{\circ} 10' E.$ , lat.  $8^{\circ} 57' N.$ , 1,290 m., 0.5 m., fls. blue, Oct., No. 4127. Vernac.—*Mor*; *Moh*; *Addur*.

*S. marginatum* Linn. f.—F.T.A. 4, 2 : 235.

ABYSSINIA : Galla Pass, long.  $42^{\circ} 19' E.$ , lat.  $9^{\circ} 28' N.$ , 2,340 m., fls. greenish cream and purple, Feb., No. 5127. Vernac.—*Umboi*.—Also in Eritrea.

*S. melastomoides* Wright—F.T.A. 4, 2 : 226.

SOMALILAND : Boundary, long.  $44^{\circ} 10' E.$ , lat.  $8^{\circ} 57' N.$ , 1,290 m., shrub 0.5 m., fls. pale blue, Oct., No. 4108. Vernac.—*Mor*.—Endemic.

*S. Melongena* Linn.—F.T.A. 4, 2 : 242.

SOMALILAND : Wobleh mt., long.  $43^{\circ} 17' E.$ , lat.  $10^{\circ} 15' N.$ , 1,380 m., prostrate or nearly so, fls. blue, Feb., No. 4983.

*S. nigrum* Linn.—F.T.A. 4, 2 : 218.

SOMALILAND : Boundary, long.  $44^{\circ} 10'$  E., lat.  $8^{\circ} 57'$  N., 1,290 m., fls. white, Oct., No. 4126. Buramo-Warieto tug, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ} 2'$  N., 1,080 m., fls. white faintly blue-tinged, Feb., No. 4923. Abyssinia : Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,430 m., fls. white, Mar., No. 5285.

*S. obbiadense* Chiov. Fl. Somala 239 (1929).

SOMALILAND : Boundary, long.  $44^{\circ} 10'$  E., lat.  $8^{\circ} 57'$  N., 1,260 m., prostrate subshrub, fls. bluish, Sept., No. 4097. Vernac.—*Me-eh godleh*.—Endemic.

*S. sepicula* Dun. in DC. Prod. 13, 1 : 283 (1852).

SOMALILAND : Abasa, long.  $43^{\circ} 4'$  E., lat.  $10^{\circ} 6'$  N., 1,470 m., up to 30 cm., fls. purple, Dec., No. 4715. Vernac.—*Mee godle*.—Also in Arabia.

*Physalis peruviana* Linn.—F.T.A. 4, 2 : 248.

ABYSSINIA : Kondudo Mt., long.  $42^{\circ} 20'$  E., lat.  $9^{\circ} 27'$  N., 2,640 m., fls. yellow with four black blotches at centre, Feb., No. 5206. Vernac.—*Tomatin*.

#### CONVOLVULACEAE.

*Convolvulus glomeratus* Choisy—F.T.A. 4, 2 : 94.

SOMALILAND : Elmis, long.  $44^{\circ} 14'$  E., lat.  $10^{\circ} 22'$  N., 510–600 m., fls. white, pink-tinged when fading, Oct., No. 4504. Vernac.—*Dānejo*.

*C. Hystrix* Vahl—F.T.A. 4, 2 : 90.

SOMALILAND : Berbera, straggling prostrate, fls. blue, Jan., No. 4735. Vernac.—*Geldabar*.

*C. sericophyllus* T. Anders.—F.T.A. 4, 2 : 90.

SOMALILAND : Elmis, 240 m., shrublet, 0.5 m., fls. white, Oct., No. 4490. Berbera, 90 m., fls. white with pink stripe, Jan., 4764.—Also in Aden.

*Merremia Cliffordii* Hutch. et E. A. Bruce, sp. nov., aspectu *M. multisectae* Hallier f., sed ramis pedunculis et calycibus longe setoso-pilosis differt.

Caules graciles, virides, primum setoso-pilosi, mox glabrescentes. Folia ambitu rotundata vel late ovata, 4–5 cm. lata, profunde 3–5-partita, glauco-viridia, glabra, segmentis pinnatipartitis et undulatum lobulatis; petioli usque ad 3 cm. longi, setoso-pilosi. Flores flavo-rubri; pedunculi foliis longiores usque ad 8 cm. longi, 2–5-flori; bracteae lineares, mucronatae, 2–3 mm. longae; pedicelli 1–1.5 cm. longi. Sepala ovato-oblonga, apice obtusa, multivenosa, circiter 1.2 cm. longa, 0.6 cm. lata, exteriora setoso-pilosa. Corolla late infundibuliformis, 2 cm. longa, glabra; tubus 1.3 cm. longus, lobis rotundatis. Antherae 6 mm. longae, apice recurvatae, filamentis 7 mm. longis. Ovarium ovoideum, glabrum; stylus 1.1 cm. longus, glaber. Discus annularis, carnosus, glaber. Capsula late ellipsoidea, glabra, calyce persistente involuta, 1.5 cm. longa.

SOMALILAND : Duwi, long.  $44^{\circ} 15'$  E., lat.  $10^{\circ} 5'$  N., 1,050 m., fls. yellowish red, fruits edible, 19 Oct., No. 4367 (type in Kew Herb.), Vernac.—*Dabolu*.

*Astrochlaena malvacea* Hall. f.—F.T.A. 4, 2 : 121.

ABYSSINIA : Mulkajibri, long. 42° 16' E., lat. 9° 24' N., 1,680 m., 1 m., corolla crimson, Feb., No. 5086.

*Ipomoea Hardwickii* (Spreng.) Hemsl. I. cardiosepala Hochst. ex Choisy—F.T.A. 4, 2 : 147.

SOMALILAND : Hargeisa, long. 44° E., lat. 9° 33' N., 1,290 m., fls. pale purple, Sept., No. 3985. Vernac.—*Saar*.

*I. cairica* (L.) Sweet Hort. Brit. ed. 1, 287 (1827). I. palmata Forssk.—F.T.A. 4, 2 : 178.

SOMALILAND : Daraweina, long. 44° 8' E., lat. 9° 40' N., 1,140 m., climber, fls. pale mauve with purple centre, Oct., No. 4282.

*I. cicatricosa* Bak.—F.T.A. 4, 2 : 194.

SOMALILAND : Hargeisa, long. 44° E., lat. 9° 35' N., 1,410 m., small shrubby plant, fls. purple, Sept., No. 4032. Vernac.—*Wahara wallis*.

*I. Donaldsonii* Rendle—F.T.A. 4, 2 : 194.

SOMALILAND : Boundary Pillar 99, long. 44° 39' E., lat. 8° 37' N., 1,140 m., small bush 0.5 m., fls. showy, white and purple, Oct., No. 4139. Vernac.—*Bulumbal*.—Endemic.

*I. obscura* Ker-Gawl—F.T.A. 4, 2 : 164.

SOMALILAND : Hargeisa, 1,290 m., fls. yellow, Sept., No. 4039.

*I. tenuirostris* Choisy—F.T.A. 4, 2 : 143.

ABYSSINIA : Fuyan Hunjuba, long. 42° 17' E., lat. 9° 26' N., 1,920 m., climber, fls. white, Feb., No. 5093 ; 5099.

*Falkia oblonga* Bernh.—F.T.A. 4, 2 : 65.

ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,950 m., fls. white with pink stripe, Feb., No. 5006.

*Dichondra repens* Forst.—F.T.A. 4, 2 : 65.

ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 25' N., 2,100 m., prostrate, fls. greenish, Mar., No. 5446.

*Hildebrandtia sericea* Hutch. et E. A. Bruce, sp. nov. affinis *H. somalensi* Engl., sed ramulis et foliis adpresse sericeis, floribus majoribus differt.

Suffrutex valde ramosus, usque ad 20 cm. altus, cortice brunneo ; rami longi sericei, breves pustuliformes et brevissimi, villosi. *Folia* fasciculata, oblanceolata, apice rotundata vel subacuta, ad basin attenuata, circiter 1 cm. longa et 3 mm. lata, adpresse cinereo-sericea. *Flores* dioici, ♂ tantum visi, subsessiles, albi ; calycis lobi 5, subaequales, ovati, acuti, circiter 2 mm. longi, extra sericei ; corolla circiter 8 mm. longa, tubo subcylindrico extra leviter pubescente, lobis late ovatis apice acutis extra pilosis circiter 3 mm. longis ; stamina subaequalia, 4, vix exserta, uno longiore ; antherae 2 mm. longae ; ovarii rudimentum hemisphericum, glabrum, stylis 2 staminibus brevioribus 4 mm. longis, stigmatibus lobulatis.

SOMALILAND : Boundary, long. 44° 15' E., lat. 8° 58' N., 1,260 m., shrublet 0.2 m., fls. white, 30 Sept., No. 4098 (type in Kew Herb.). Vernac.—*Mirrhu*.

*H. somalensis* Engl.—F.T.A. 4, 2 : 70.

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., sometimes climbing, Oct., No. 4156. Jebel Wotni, long. 45° 6' E., lat. 10° 18' N., 390 m., climbing in Acacia, fls. yellowish, Jan., No. 4799. Vernac.—*Daiyu*.

*Hildebrandtia villosa* Hutch. et E. A. Bruce, sp. nov., affinis *H. africanae* Vatke, sed pilis patulis dense villosa differt.

Suffrutex ramosus usque ad 20 cm. altus, cortice cinereo-albido, ramulis lateralibus gracilibus apice subspinescentibus; ramuli ultimi pustuliformes. *Folia* fasciculata, oblongo-oblancheolata, apice rotundata, basi angustata, 0.7–1 cm. longa, 2–3 mm. lata, pilis patulis dense et molliter villosa. *Flores* dioici, solitarii; ♂ breviter pedicellati: calycis lobi 4, inaequales, exteriores 2 multo majores, late elliptici, apice rotundati, 2 mm. longi, 1.5 mm. lati, pilosi, interiores 2 obovati, acute acuminati, 1.5 mm. longi; corolla pallide flava, vix 1 cm. longa, tubo infundibuliformi extra glabro, lobis late ovatis apice emarginatis et pilis brevibus ornatis 3 mm. longis; stamina inaequalia, longiora leviter exserta; antherae vix 2 mm. longae; ovarii rudimentum ovoideum, glabrum, stylis 2 filiformibus 1 cm. longis apice laciniatis. *Flores* ♀ pedicellis 8 mm. longis; calycis lobi valde inaequales, exteriores 2 decurrentes, suborbiculares, basi cuneati, 1 cm. longi, pilosi, interiores 2 minimi, transverse oblongo-elliptici, 1 mm. longi, fere glabri; corolla tubulosa, 8 mm. longa, lobis oblongis; staminum rudimenta parva; ovarium late ovoideum, 1.5 mm. longum, glabrum; styli 2, filiformes, longe laciniati.

SOMALILAND: Dubar, long. 45° 5' E., lat. 10° 20' N., 300 m., 20 cm., fls. pale yellow, bracts enlarged green, 2 Jan., No. 4770 (type in Kew Herb.); 4771; without locality, *Lort Phillips*. Vernac.—*Daiyu*.

*Seddera arabica* (Forssk.) Choisy—F.T.A. 4, 2: 76.

SOMALILAND: Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., fls. white, Oct., No. 4111. Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,140 m., 20 cm., fls. white, Feb., No. 4962.

*Seddera cinerea* Hutch. et E. A. Bruce, sp. nov. affinis *S. latifoliae* Hochst. et Steud., sed foliis plus minusve ovatis, floribus pedicellatis, corolla calyce longiore differt.

Suffrutex usque ad 30 cm. altus, basi lignosissimus; caules erecti, laxe foliati, molliter cinereo-tomentosi. *Folia* ovata vel ovato-rotundata, apice acuta vel rotundata, mucronata, basi rotundata, 1.8 cm. longa, 1.3 cm. lata, crassa, molliter cinereo-tomentosa, nervis lateralibus utrinsecus circiter 3 infra prominentibus; petioli circiter 3 mm. longi. *Flores* solitarii, axillares; pedicelli 2.5 mm. longi, medium versus bracteolis duabus subulatis instructi. *Calycis lobi* leviter inaequales, elliptico-lanceolati, acuti, usque ad 8 mm. longi, extra stellato-pubescentes. *Corolla* alba, fere 1 cm. longa; tubus anguste infundibuliformis, glaber, lobis ovato-triangularibus, extra adpresse pilosis. *Stamina* exserta, filamentis inferne bilobulatis. *Ovarium* ovoideum, apice pilosum; styli ad basin liberi, glabri, stigmatibus parvis capitatis.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,140 m., fls. white, 22 Oct., No. 4426 (type in Kew Herb.).

*S. Hallieri* Engl. & Pilger in Engl. Bot. Jahrb. 41: 294 (1908).

SOMALILAND: Hargeisa, long. 44° E., lat. 9° 33' N., 1,290 m., fls. white, Sept., No. 3972.—Endemic.



*S. latifolia* Hochst. & Steud.—F.T.A. 4, 2 : 75.

SOMALILAND : Hargeisa, 1,440 m., fls. white, Sept., No. 3952.  
Vernac.—*Nagad*.

*S. spinescens* Peter—F.T.A. 4, 2 : 74.

SOMALILAND : near Dubar, long.  $44^{\circ} 5' E.$ , lat.  $10^{\circ} 20' N.$ , 120 m., fls. white, Jan., No. 4765.—Endemic.

*Bonamia glomerata* (Balf. f.) Hall. f. in Engl. Bot. Jahrb. 18 : 90 (1894). *Breweria glomerata* Balf. f.

SOMALILAND : Debraŵen, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} 5' N.$ , 1,020 m., prostrate, fls. pinkish, Feb., No. 4935.—Also in Socotra.

*Cuscuta planiflora* Ten.—F.T.A. 4, 2 : 203.

SOMALILAND : Hargeisa, long.  $44^{\circ} E.$ , lat.  $9^{\circ} 35' N.$ , 1,380 m., fls. white, Oct., No. 4273.

ABYSSINIA : Gafra valley, long.  $42^{\circ} 13' E.$ , lat.  $9^{\circ} 21' N.$ , 1,500 m., fls. white, stems dark crimson, Feb., No. 5074.

#### SCROPHULARIACEAE.

*Celsia keniensis* Murb. in Lunds Univ. Årsskrift, n.f. 22, 1 : 70 (1925).

ABYSSINIA : Yuka, long.  $41^{\circ} 40' E.$ , lat.  $9^{\circ} 25' N.$ , 2,250 m., fls. yellow with crimson marks, Mar., No. 5461.—Also in Kenya.

*Verbascum Schimperii* Skan in F.T.A. 4, 2 : 280.

ABYSSINIA : Galla Pass, long.  $42^{\circ} 19' E.$ , lat.  $9^{\circ} 28' N.$ , 2,340 m., shrub 3 m., fls. greenish, ripe fruit orange, Feb., No. 5125. Kondudo Mt., long.  $42^{\circ} 20' E.$ , lat.  $9^{\circ} 27' N.$ , 2,910 m., fls. yellow, No. 5225.  
Vernac.—*Timbolone*.

*V. Ternacha* Hochst. ex A. Rich.—F.T.A. 4, 2 : 279.

ABYSSINIA : Harar, long.  $42^{\circ} 6' E.$ , lat.  $9^{\circ} 18' N.$ , 1,920 m., 0.5 m., fls. yellow, Feb., No. 5012.

*Anticharis linearis* Hochst. ex Aschers.—F.T.A. 4, 2 : 276.

SOMALILAND : Slopes of Marmar range, long.  $42^{\circ} 47' E.$ , lat.  $10^{\circ} 29' N.$ , 1,050 m., plant viscid, fls. blue, Nov., No. 4657.  
Vernac.—*Dia tiri*.

*Alectra asperrima* Benth.—F.T.A. 4, 2 : 369.

SOMALILAND : Hargeisa, long.  $44^{\circ} E.$ , lat.  $9^{\circ} 35' N.$ , fls. yellow, Oct., No. 4250.

*A. parasitica* A. Rich.—F.T.A. 4, 2 : 366.

SOMALILAND : Hargeisa, long.  $44^{\circ} 2' E.$ , lat.  $9^{\circ} 34' N.$ , 1,380 m., fls. yellow, stem purple, Oct., No. 4276.

*Bartsia longiflora* Hochst. ex Benth.—F.T.A. 4, 2 : 461.

ABYSSINIA : Kondudo mt., long.  $42^{\circ} 20' E.$ , lat.  $9^{\circ} 27' N.$ , 2,700 m., 1 m., viscid, fls. sulphur yellow with crimson veins, Feb., No. 5224.

*B. Petitiana* Hemsl.—F.T.A. 4, 2 : 460.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 48' E.$ , lat.  $9^{\circ} 12' N.$ , 2,880 m., fls. pink, Mar., No. 5322.

*Cycnium erectum* Rendle—F.T.A. 4, 2 : 434.

ABYSSINIA : Yuka, long.  $41^{\circ} 40' E.$ , lat.  $9^{\circ} 25' N.$ , 2,070 m., 1.5 m., fls. white fragrant, Mar., No. 5417.—Also in Somaliland.

*Striga gesnerioides* (Willd.) Vatke in Oest. Bot. Zeitschr. 1875 : 11.  
*S. orobanchoides* Benth.—F.T.A. 4, 2 : 402.

SOMALILAND : Hargeisa, long. 44° E., lat. 9° 33' N., 1,380 m., fls. pale pink, Oct., No. 4253. Junction of tugs, long. 44° 18' E., lat. 9° 57' N., 810 m., fls. pink, Oct., No. 4347. Buramo, long. 43° 10' E., lat. 10° N., 1,440 m., fls. pink, Dec., No. 4723. Buramo Warieto tug, long. 43° 10' E., lat. 10° 2' N., 1,080 m., Feb., No. 4918. Near Buramo, long. 43° 10' E., lat. 10° N., 1,500 m., fls. pink, plant purplish green, Dec., No. 4722. Debrawen, long. 43° 10' E., lat. 10° 5' N., 1,020 m., fls. crimson, Feb., No. 4938. Vernac.—*Ara mudoweyi*.

*Linaria hastata* R. Br.—F.T.A. 4, 2 : 290.

SOMALILAND : Barataga, long. 44° 1' E., lat. 10° 5' N., 990 m., fls. yellow, Oct., No. 4525.

*Schweinfurthia pedicellata* Benth. & Hook. f. in Gen. Pl. 2 : 934 (1876).

ADEN : 150 m., fls. pale purple, Mar., No. 5501.—Also in Socotra.

*S. pterosperma* A. Br.—F.T.A. 4, 2 : 293.

SOMALILAND : Las Dawan, long. 45° 12' E., lat. 10° 20' N., 180 m., annual, fls. pale lilac with yellow and purple markings, Jan., No. 4807.

*Halleria lucida* Linn.—F.T.A. 4, 2 : 295.

ABYSSINIA : Gara mulata Mt., long. 41° 45' E., lat. 9° 15' N., 2,490 m., bush 4 m., fls. red, Mar., No. 5376.

*Lindenbergia sinaica* Benth.—F.T.A. 4, 2 : 312.

SOMALILAND : Elmis, long. 44° 14' E., lat. 10° 22' N., 570 m., herb 20 cm., viscid, aromatic, fls. bright yellow with crimson, mottlings at throat, Oct., No. 4503. Ali Wein Mt., long. 45° 15' E., lat. 10° 24' N., 300 m., very aromatic, fls. yellow with red and purple markings, Jan., No. 4825. Aden : 300 m., fls. yellow, Mar., No. 5484. Vernac.—*Farahod*.

*Craterostigma plantagineum* Hochst.—F.T.A. 4, 2 : 329.

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., fls. white and blue with yellow centre, Oct., No. 4159. Sigib mt., long. 43° 11' E., lat. 10° 19' N., 1,470 m., fls. blue with white margins and yellow spots in throat, Feb., No. 4995.

*Campylanthus junceus* Edgw. in Journ. As. Soc. Beng. 16 : 1217 (1847).

SOMALILAND : Camp 4, long. 44° 16' E., lat. 10° N., 1,080 m., fls. pale lilac, Oct., No. 4356. Dubriat Mt., long. 45° 10' E., lat. 10° 22' N., 150 m., slender twiggy shrub up to 2.5 m., fls. blue, Jan., No. 4775. Aden : 150–450 m., 1 m., fls. white, Mar., No. 5496. Vernac.—*Merho dabera*.—Known previously only from Aden.

*Veronica abyssinica* Fresen.—F.T.A. 4, 2 : 358.

ABYSSINIA : Harar-Gobelli Road, No. 5254. Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,520 m., prostrate, fls. sky-blue, Mar., No. 5289.

*V. Anagallis-aquatica* Linn.—F.T.A. 4, 2 : 357.

ABYSSINIA : Mulkajibri, long. 42° 16' E., lat. 9° 24' N., 1,620 m., fls. pale blue, Feb., No. 5078. Vernac.—*Mej. Gusnole*.

# OROBANCHACEAE.

*Cistanche Phelipaea* (Linn.) Cout. Fl. Port. 571; F.W.T.A. 2: 231. *C. lutea* Hoffm. & Link—F.T.A. 4, 2: 463.

SOMALILAND: Hargeisa, long. 44° E., lat. 9° 33' N., 1,290 m., fls. yellow, Oct., No. 4240. Near Buramo, long. 43° 10' E., lat. 10° N., 1,500 m., fls. yellow, Nov., No. 4603. Vernac.—*Oro warraba*; *Hablo bor*.

*Orobanche cernua* Loefl. var. *desertorum* Beck.—F.T.A. 4, 2: 466.

SOMALILAND: Hargeisa, 1,290 m., fls. cream and violet, Sept., No. 3957. Buramo-Warieto tug, long. 43° 10' E., lat. 10° 2' N., 1,080 m., fls. white and purple, Feb., No. 4921. Vernac.—*Oro-waraba*.

# BIGNONIACEAE.

*Rhigozum somalense* Hall. f.—F.T.A. 4, 2: 532.

SOMALILAND: Afard, long. 44° 8' E., lat. 10° 10' N., 540 m., shrub 3 m., fls. yellow, Oct., No. 4455. Vernac.—*Binin*.—Endemic.

# PEDALIACEAE.

*Pterodiscus undulatus* Bak. f.—F.T.A. 4, 2: 545.

SOMALILAND: Bir Dai, long. 44° 18' E., lat. 9° 55' N., 900 m., bare sand near tug, herb, fls. pink, Oct., No. 4334. Vernac.—*Burki māla*.—Endemic.

*P. Wellbyi* Stapf—F.T.A. 4, 2: 544.

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., fls. dull red outside, yellowish within, Oct., No. 4220. Vernac.—*Burri Wey*.

*Sesamothamnus Smithii* Bak.—F.T.A. 4, 2: 568.

SOMALILAND: Boundary Pillar 93, 990 m., shrub 3 m., fls. very handsome red and white, Oct., No. 4179. Vernac.—*Sulelma*.

# ACANTHACEAE.\*

*Ruellia discifolia* Oliv.—F.T.A. 5: 47.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., fls. white opening at night, Sept., No. 3989. Vernac.—*Hābo*.—Endemic.

*R. lineari-bracteolata* Lindau—F.T.A. 5: 47.

SOMALILAND: Camp 4, long. 44° 16' E., lat. 10° N., 1,050 m., fls. pale lilac, Oct., No. 4364.—Endemic.

*R. patula* Jacq.—F.T.A. 5: 45.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., in tree Acacia formation, fls. blue, Sept., No. 3943. Boundary, long. 44° 15' E., lat. 8° 55' N., 1,260 m., Sept., No. 4076. Ali Wein Mt., long. 45° 15' E., lat. 10° 24' N., 600–840 m., on limestone slopes, fls. purple, Jan., No. 4827. Vernac.—*Gāgāleh*.

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\* Determinations by E. Milne-Redhead and Dr. Chiovenda.

*Thunbergia Paulitschkeana* Beck—F.T.A. 5 : 13.

ABYSSINIA : Harar, long.  $42^{\circ} 6' E.$ , lat.  $9^{\circ} 18' N.$ , 1,950 m., on limestone in open grass, prostrate herb, fls. bright yellow, Feb., No. 5022.—Endemic.

*Dyschoriste fruticulosa* (Rolfe) Chiov. Fl. Somala 249.

D. somalensis Rendle—F.T.A. 5 : 78.

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., on alluvium, fls. yellow, Sept., No. 4017. Vernac.—*Gāgāleh*.—Endemic.

*Dyschoriste radicans* Nees—F.T.A. 5 : 73.

ABYSSINIA : Harar, long.  $42^{\circ} 6' E.$ , lat.  $9^{\circ} 18' N.$ , 1,950 m., on limestone, prostrate herb, fls. blue, Feb., No. 5032.

*Asystasia Coleae* Rolfe—F.T.A. 5 : 135.

SOMALILAND : Duwi, long.  $44^{\circ} 15' E.$ , lat.  $10^{\circ} 5' N.$ , 1,020 m., in tree-Acacia-grass community, fls. white, Oct., No. 4423 ; Buramo, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} N.$ , 1,260 m., on sandy bank, Jan., No. 4873 ; Abyssinia, S.W. of Fuyan Hunjuba, long.  $42^{\circ} 17' E.$ , lat.  $9^{\circ} 26' N.$ , 1,890 m., in waste places, prostrate, Feb., No. 5096.

*A. parvula* C.B.Cl.—F.T.A. 5 : 132.

SOMALILAND : Dobo Pass, long.  $43^{\circ} 15' E.$ , lat.  $10^{\circ} 15' N.$ , 1,200 m., on gneiss slopes, fls. white with crimson veins on lower lip, Feb., No. 4953.—Endemic.

*Crossandra nilotica* Oliv.—F.T.A. 5 : 115.

SOMALILAND : Biyu suldan, long.  $43^{\circ} E.$ , lat.  $10^{\circ} 20' N.$ , 1,200 m., in ravine with *Ficus*, fls. purple, Dec., No. 4703.

*C. spinosa* Beck.—F.T.A. 5 : 114.

SOMALILAND : Duwi, long.  $44^{\circ} 15' E.$ , lat.  $10^{\circ} 5' N.$ , 900 m., on rock slopes with Commiphora, fls. yellow, Oct., No. 4390 ; Debrawen, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} 5' N.$ , on stony limestone hill, Feb., No. 4933.

*Blepharis edulis* (Forssk.) Pers.—F.T.A. 5 : 102.

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., dry ground, fls. blue, Sept., No. 4001. Vernac.—*Yamarug*.

*B. fruticulosa* C.B. Cl.—F.T.A. 5 : 99.

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., on stony sandstone slopes and drier alluvium, fls. blue, Sept., No. 4011. Vernac.—*Habag yamaru*.

*B. linariifolia* Pers.—F.T.A. 5 : 100.

ABYSSINIA : Haramaia-Harar Road, long.  $42^{\circ} 4' E.$ , lat.  $9^{\circ} 20' N.$ , 1,980 m., prostrate, fls. blue, Mar., No. 5474.

*Acanthus eminens* C.B. Cl.—F.T.A. 5 : 107.

ABYSSINIA : near Kofajalo, long.  $41^{\circ} 51' E.$ , lat.  $9^{\circ} 9' N.$ , 2,280 m., on limestone, by stream, 3 m. high, scandent, fls. deep blue, Mar., No. 5280.

*Barleria acanthoides* Vahl—F.T.A. 5 : 152.

SOMALILAND : between Duwi and Afard, long.  $44^{\circ} 10' E.$ , lat.  $10^{\circ} 8' N.$ , 720 m., on schist rocks, fls. pink, Oct., No. 4436. Jalelo, long.  $44^{\circ} 14' E.$ , lat.  $9^{\circ} 45' N.$ , 1,080 m., fls. white, Oct., No. 4298. Werawis valley, long.  $43^{\circ} 50' E.$ , lat.  $10^{\circ} 15' N.$ , 690 m., Nov., No. 4535.

*B. diffusa* (Oliv.) Lindau in Engl. & Prantl. Pfl. Fam. 4, 3B : 315.  
SOMALILAND : Boundary, long. 44° 10' E., lat. 8° 57' N., 1,260 m.,  
in open places, fls. pale blue, Sept., No. 4093. Vernac.—*Ged hared*.

*B. eranthemoides* R. Br. ex C.B. Cl.—F.T.A. 5 : 147.

SOMALILAND : Simodi, long. 43° 30' E., lat. 10° 5' N., 1,200 m.,  
Nov., No. 4564. Abyssinia : Gafra Valley, long. 42° 13' E., lat.  
9° 21' N., 1,500 m., on granite in deciduous scrub, fls. yellow, Feb.,  
No. 5070. Vernac.—*Wana ad* (Somali).

*B. Hildebrandtii* S. Moore—F.T.A. 5 : 162.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m.,  
on drier alluvium, fls. blue, Sept., No. 4005. Long. 43° 16' E.,  
lat. 10° 5' N., 1,140 m., 30 cm., fls. blue, Nov., No. 4598. Vernac.—  
*Habo*.—Endemic.

*B. Hochstetteri* Nees—F.T.A. 5 : 156.

SOMALILAND : long. 44° 8' E., lat. 10° 10' N., 510 m., fls. pale  
pink with crimson spot in throat, Oct., No. 4435. Kabri bahr,  
long. 43° 44' E., lat. 10° 20' N., 420 m., Nov., No. 4546.

*B. parviflora* R. Br. ex T. Anders.—F.T.A. 5 : 156.

SOMALILAND : Hargeisa, 1,290 m., on stony slopes, fls. pink,  
Sept., No. 3991 ; Duwi Pass, long. 44° 15' E., lat. 10° 5' N., 1,080 m.,  
Oct., No. 4365.

*B. proxima* Lindau—F.T.A. 5 : 145.

SOMALILAND : Hargeisa, 1,290 m., on stony sandstone slopes,  
Oct., No. 3990 ; Boundary, long. 44° 39' E., lat. 8° 47' N., 1,140 m.,  
in shade of trees, Oct., No. 4147. Vernac.—*Odon Tonleh Aran* ;  
*ad*.—Endemic.

*Barleria* (Prionitis) *punctata* Milne-Redhead, sp. nov. a *B.*  
*diacantha* Hochst. ex Nees foliis minoribus punctatis, bracteis haud  
dense pubescentibus, calycis segmentis minoribus obtusis glabris  
pruinosis facile distinguenda.

Planta fruticosa, spinosa ; rami dense ramulosi, nodos versus  
sparse strigosi, internodiis brevibus. *Folia* subsessilia, elliptica vel  
late oblanceolata, apice obtusa vel acuta, mucronata, basi attenuata,  
usque 2.5 cm. longa et 1.5 cm. lata, utrinque glabra sed margine et  
nervis parcissime adpresse strigosis, utrinque minute nigroglanduloso-  
punctata et cystolithis inconspicuis dense instructa. *Spinae* axillares  
breviter stipitatae, radiis 2 vel interdum 3 usque 1.9 cm. longis  
albo-brunneis patentibus instructae. *Inflorescentiae* uniflorae, axil-  
lares, apicem versus ramulorum spicatum aggregatae ; bractee  
inferiores foliis similes, superiores minores apice valde spinosae,  
basin versus plus minusve dense et conspicue peltato-glandulosae ;  
bracteolae minutae, anguste lanceolatae, acutae, haud spinosae,  
usque 2 mm. longae, glabrae, ciliatae, pruinosae. *Calycis segmenta*  
4, valde imbricata, basin versus tubum brevem formantia, ovata vel  
late elliptica, circiter 4 mm. longa et 3 mm. lata, lateralia angustiora,  
omnia apice rotundata, extra inferne et medium versus sparse  
hirsuta, superne pruinosa, intus glabra. *Corolla* flava, circiter  
3.2 cm. longa, bilabiata, glabra ; tubus cylindricus, inferne leviter  
ampliatus, circiter 1.5 cm. longus et 3 mm. diametro ; labium

posticum circiter 1.7 cm. longum, inferne tubiforme, superne expansum, 4- vel 3-lobatum; lobi obovati, circiter 11 mm. longi et 9 mm. lati, apice rotundati, basi vix angustati; labium anticum obovatum, apice rotundatum vel obscure 3-lobatum, basi angustatum, 1.4 cm. longum et 1.1 cm. latum. *Stamina* 2, filamentis anguste ligulatis minute puberulis, antheris dithecis circiter 4 mm. longis; staminodia 2, filamentis filiformibus circiter 4 mm. longis, antheris valde reductis sterilibus. *Discus* cupularis, liber, margine irregulariter undulatus, circiter 1 mm. altus. *Ovarium* conicum, vix 4 mm. altum, glabrum; stylus filiformis, circiter 2.8 cm. longus, glaber; stigma cylindricum. *Capsula* disperma, rostrata, 1.7 cm. longa, glabra.

SOMALILAND: Baratiga, long. 44° 1' E., lat. 10° 5' N., 1,290 m., 1 m., fls. yellow, 31 Oct., No. 4522 (type in Kew Herb.). Vernac.—*Aran ad.*

*B. quadrispina* Lindau—F.T.A. 5: 147.

SOMALILAND: Hargeisa, 1,290 m., on stony sandstone slopes, fls. white, Sept., No. 3994. Vernac.—*Aran ad.*

*B. somalensis* Franch. in Révoil Somali 51 (?).

SOMALILAND: Simodi, long. 43° 30' E., lat. 10° 5' N., 1,680 m., corolla-lobes sky blue, tube white, Nov., No. 4564.—Endemic.

*B. ventricosa* Hochst. ex Nees—F.T.A. 5: 164.

SOMALILAND: Galla Pass, Feb., No. 5111A.

The following numbers of *Barleria* have not yet been determined, some being represented by rather imperfect material:—Nos. 4243, 4360, 4449, 4574, 4999, 5111.

*Adhatoda Schimperiana* Nees—F.T.A. 5: 221.

SOMALILAND: Wobleh Mt., long. 43° 17' E., lat. 10° 15' N., 1,350 m., in tree *Acacia* open wood, fls. white, scrambling to 3 m., Nov., No. 4594. Abyssinia: Harar, long. 42° 10' E., lat. 9° 20' N., 1,650 m., on granite, ascending woody herb, corolla white, calyx and flowering bracts pale green, Feb., No. 5057.

*Peristrophe bicalyculata* (Retz.) Nees—F.T.A. 5: 242.

SOMALILAND: Hargeisa, 1,290 m., in *Acacia-Zyzyphus*-grass community in moist places, fls. crimson, 0.5 m. high, Oct., No. 4236.

*Isoglossa somalensis* Lindau?—F.T.A. 5: 231.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 25' N., 2,280 m., in shaded gully by stream, fls. pinkish-white, Feb., No. 5198.

*Dicliptera glanduligera* Chiov., sp. nov.; affinis *D. maculatae* (Hochst.) Nees, quae differt bracteis ellipticis obtusis; bracteis spinulosis ad *D. micrantham* vergit.

Herba ramis semi-metralibus breviter densiuscule pubescentibus, internodiis 4–12 cm. longis 1.5–2 mm. crassis. *Folia* petiolata opposita; petiolus gracilis, 7–18 mm. longus, puberulus; laminae ovatae vel ovato-lanceolatae, basi rotundatae vel aliquantum cuneatae, apicem versus longe acuminatae, acutae, 6–7 cm. longae 3–3.7 cm. latae, membranaceae, supra intense virides, pilis parvis setulosis sparsae subtus pallidae paulo densius pilosae; margines integerrimi, plani; folia floralis regionis valde minora, petiolo

4-6 mm. longo, lamina ovato-lanceolata vel lanceolata usque lanceolato-lineari 0.6-3 cm. longa, 1-13 mm. lata. *Inflorescentiae* umbellatae, laxae, ex axillis superioribus orientes; pedunculus 5-15 mm. longus, dense breviterque pilis simplicibus patulis et glandulis crebris flavescenti-pubescentibus; spicularum uniflorarum pedicelli 4-8 mm. longi, flavido-glanduloso-pubescentes; bractae 2, oppositae, oblanceolatae, paullum inaequales, interior 8 mm. longa, exterior 10 mm. longa, 2.5-3.5 mm. latae, basi parum longius attenuatae, apice brevius acuminatae, spinuloso-cuspidatae, subcoriaceae, rigidulae, e basi manifeste trinerviae, nervis viridibus prope basin in colore albedo per reliquas bracteas valde conspicuis, extra dense glandulis subsessilibus scabridae. *Calyx* dentibus 5, 4 subaequalibus 2 anticis et posticis cum intermedio breviori omnibus subulato-acuminatis, longioribus 6 mm. longis, brevior 5 mm. longo. *Corolla* pallide rosea, tubo cylindrico 7-8 mm. longo, apice 2 mm. diam. extus pilosulo; labium superius ellipticum, 10-11 mm. longum, 5 mm. latum, apice obtusissimum integrum, dorso convexum, extra parce pilosulum; inferius 11-12 mm. longum, 3 mm. latum, marginibus subparallelis, apice obtuse 3-dentatum. *Stamina* 2, filamentis 9 mm. longis, papilloso-pilosulis usque ad 1/2 superius; antherae dithecae, thecis globosis 1 mm. circ. longis et latis, immediate superpositis. *Capsula* ovato-lanceolata, 7 mm. longa, 3 mm. lata, nervis dorsalibus 1 mm. circ. latis, marginibus membranaceis, extra pilosula, maturitate cum elasticitate aperiens, marginibus laceratis. *Semina* subrotunda, lenticularia, 2 mm. longa et lata, compresso-explanata, fusce flavescentia, nigro-punctulata.

ABYSSINIA: S.E. of Yuka, long. 41° 40' E., lat. 9° 25' N., 2,220 m., in *Juniperus-Podocarpus* forest, fls. crimson, 7 Mar., No. 5407 (type in Kew Herb.).

*Dicliptera verticillata* (Forssk.) C. Chr. in Dansk. Bot. Arkiv. 4, 3: 11 (1922).

SOMALILAND: Buramo, long. 43° 10' E., lat. 10° N., 1,470 m., fls. small, corolla tube white, lobes purplish, Dec., No. 4719.

*Justicia aridicola* Rendle—F.T.A. 5: 193.

SOMALILAND: Hargeisa, 1,290 m., among aloes, fls. blue, 0.5 m. high, Sept., No. 3937; Debrawen, long. 42° 10' E., lat. 10° 5' N., 990 m., on limestone alluvium, Feb., No. 4929. Vernac.—*Habo*.

*J. flava* Vahl—F.T.A. 5: 190.

SOMALILAND: Hargeisa, 1,290 m., in tree Acacia formation, fls. yellow, Sept., No. 3926.

*Justicia Gillettii* Chiov., sp. nov. (§Calophanoides), sepalis demum rigidis videtur insignis; *J. Lazaru* S. Moore et *J. galeopsidi* T. And. vicinior.

Caules graciles elongati, internodiis 1.5-4.5 cm. longis, tetragonis, valde ramosis, ramis 13-20 cm. longis patentibus simplicibus vel iterum divisis, internodiis 1.5-2.5 cm. longis, ramulis 1.5-4 cm. longis internodiis abbreviatis. *Folia* opposita, caulina subsessilia vel sessilia, ovata vel ovato-lanceolata, 8-18 mm. longa 3-6 mm.

lata, supra intense viridia, sparse pilosula, in axillis foliorum floralium valde diminutorum ovato-lanceolatorum vel linearium 5-6 mm. longorum 1-1.5 mm. latorum obtusiusculorum fasciculata. *Calyx* 4.6-6 mm. longus, sepalis 5 aequalibus anguste linearibus sub anthesi viridibus tenuissime pilosulis, albo-marginulatis, post anthesin albicantibus glabris, basi 1.5 mm. latis, usque ad  $\frac{1}{4}$  vel  $\frac{1}{2}$  inferius post anthesin incrassatis, dorso rotundatis rigidis, supra sensim subulato-attenuatis acutissimis, erectis. *Corolla* rosea, tubo pallido cylindrico circ. 5 mm. longo, apice leviter dilatato, extra minute pilosulo; labium superius circ. 3 mm. longum, ovatum, tubum continuans, apice vix brevissime bidentatum, longitudinaliter rubro-nervosum; inferius circ. 5 mm. longum, 4 mm. latum, obtuse trilobum, supra glabrum, rubrum, subtus puberulum, pallidum. *Stamina* quam labium superius vix breviora, filamentis glabris. *Ovarium* glabrum, anguste lanceolatum, stylo glabro.

SOMALILAND: Boundary, 1,290 m., in *Acacia latronum* association, fls. crimson, 2 Oct., No. 4110 (type in Kew Herb.).

*J. heterocarpa* T. Anders.—F.T.A. 5: 200.

SOMALILAND: Debrawen, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} 5' N.$ , 990 m., on limestone alluvium, fls. pink, Feb., No. 4932.

*J. Lortae* Rendle—F.T.A. 5: 201.

SOMALILAND: Boundary, long.  $44^{\circ} 10' E.$ , lat.  $8^{\circ} 57' N.$ , 1,290 m., fls. yellow, Oct., No. 4121.

*Justicia minutifolia* Chiov. sp. nov. (§*Calophanoides*).

Fruticulus demissus, caulibus caespitosis e basi ramosissimis, longioribus humistratis, vetustioribus cortice pallide cinereo, fibroso-dilacerato; rami floriferi 5-10 cm. longi, erecti, recti, rigidi, post mortem albidii usque candidi, apice subspinescentes; internodia 0.3-2.5 cm. longa. *Folia* omnino parva, subsessilia, cum ramulis abbreviatis subfasciculata; petiolus 0.5-0.7 mm. longus; lamina lineari-obovata, vel lineari-oblancoolata, 3-6 mm. longa, 1-2 mm. lata, utrinque attenuata, basi saepius magis, apice obtusa vel rotundata, sicco viridi-cinerascens, utrinque pilis densiusculis brevissimis subsericeis adpressis canescens, costa sola subtus prominula, nervi et venae omnino evanidi. *Flores* axillares, solitarii, subsessiles. *Calyx* 4 mm. longus; tubus brevissimus, vix 0.5 mm. longus; sepalis linearia 3.5 mm. longa, basi 1 mm. lata, apice acuta, extra adpresse cinereo-puberula. *Corolla* 8 mm. longa, intus rubra, extra pallida, puberula, tubo 5 mm. longo, sensim sursum ampliato; labia subaequilonga, 3 mm. longa; superius ovatum, apice emarginatum; inferius rotundato-ovatum, obtuse trilobum. *Ovarium* lanceolatum, densiuscule pilosum; stylus filiformis, 8 mm. longus, basi pilosulus, superne glaber. *Capsula* lanceolata, 6 mm. longa, 1.2-2 mm. lata et spissa, obtuse tetragona, pilis brevissimis undique sparsa. *Semina* 1 pro loculo, subrotunda, 2 mm. circ. diam., corrugata.

SOMALILAND: Boundary, long.  $40^{\circ} 10' E.$ , lat.  $8^{\circ} 57' N.$ , 1,260 m., on limestone in deep red soil, 29 Sept., No. 4079A (type in Kew Herb.).



*Justicia scabrula* Chiov. sp. nov. (§*Calophanoides*); affinis *J. Phillipsiae* Rendle foliis nigricantibus scaberulis obovatis vel oblanceolatis obtusissimis calycibus brevioribus differt.

Fruticulus ramosissimus, ramis vetustis lignosis cortice pallide cinereo tectis, junioribus dense pilis minutissimis adpressis canescentibus; caulium internodia 2.5–4.5 cm. longa, ramorum et ramulorum floriferorum 5–15 mm. longa. *Folia* sicco nigricantia; petiolus 0.5–1 mm. longus; laminae anguste obovatae vel oblanceolatae, basi cuneatim angustatae, apice rotundae vel obtusae, 3–10 mm. longae, 2–4, 5 mm. latae, utrinque densiuscule papilloso-scaberulae, caeterum glabratae, crassiusculae, rigidulae, nervis obsoletis, costa sola subtus prominente supra vix sensibili. *Flores* in axillis solitarii; pedicellus 1–1.5 mm. longus, pilosiusculus. *Calyx* 4 mm. longus, farinulente pilosulus, tubo campanulato 1 mm. circ. longo, 2.5 mm. lato; sepala 5, linearia; 3 mm. longa, e basi 0.5–0.7 mm. lata sensim angustata, apice acuta. *Corolla* rosea, tubo cylindrico 6 mm. longo 1.5 mm. diam. lato albido extra minute puberulo; labium superius tubum continuans 5 mm. longum, apice breviter obtuse bilobulatum, extra puberulum; labium inferius obovatum 6 mm. longum, apice 5 mm. latum, profundiuscule 3-lobatum, lobis 1.5–2 mm. longis obtusis, supra sparse pilosum. *Stamina* cum antherarum apicibus labii superioris summitatem aequantia, filamentis 3–5 mm. longis glabris; antheris cum theca inferiore obtuse breviterque caudata. *Ovarium* lanceolatum, 2–2.5 mm. longum, acuminatum, glabrum; stylus filiformis, 7–8 mm. longus, usque ad medium vel infra hirtellus.

SOMALILAND: Buramo-Dumuk tug, long. 43° 12' E., lat. 10° 1' N., 1,260 m., in gneiss gorge with permanent stream, 0.5 m. high, fls. pink and crimson, 29 Jan., No. 4881 (type in Kew Herb.).

*J. uncinulata* Oliv.—F.T.A. 5: 210.

SOMALILAND: Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,200 m., on gneiss hills, prostrate, rooting at the nodes, fls. white spotted with crimson, Feb., No. 4958.

The following numbers of *Justicia* have not been determined:—4038; 4078; 4079; 4116; 4315; 4351; 4673; 4801.

*Monechma debile* (Forssk.) Nees in DC. Prod. 11: 411.

*M. bracteatum* Hochst.—F.T.A. 5: 214.

SOMALILAND: Buramo, Varieto tug, long. 43° 10' E., lat. 10° 2' N., 1,080 m., in bare damp stony stream bed, fls. pale crimson, Feb., No. 4924. Buramo, long. 43° 10' E., lat. 10° N., 1,470 m., fls. white and crimson, Dec., No. 4720.

*Monechma troglodytica* Chiov. sp. nov. videtur proxima *M. varianti* C. B. Clarke.

Herba annua, caulibus usque ad 20 et amplius cm. longis, pluribus, caespitosis, inferne induratis, geniculato-adscendentibus, e basi ramosis, obtuse tetragonis, pilis minutissimis reflexis puberulis. *Folia* sessilia, sicco viridi-fuscescentia; lamina oblanceolata, basi longiuscule attenuata, apice rotundata vel leviter contracta, obtusa, 8–20 mm. longa, 2–6 mm. lata, crassula, sicco rigidula, nervis

evanidis, costa subtus vix prominula flavescente, omnes utrinque etiam floriferae caeteris multo minores omnino glabrae. *Flores* in axillis ramulorum superioribus 5-6 foliorum diminutorum, pulverulento-puberulorum, internodiis inferioribus 10-15 mm. longis, superioribus brevioribus separatis dispositi, racemos laxos formantes; pedicelli brevissimi vel subnulli. *Calyx* 4 mm. longus, sepalis linearibus, basi brevissime coalitis, 0.5 mm. latis, apice sensim subulato-attenuatis, brevissime denseque albo-ciliolatis. *Corolla* rosea, extra minute pilosula; tubus pallidus, 5 mm. longus; labium superius tubum continuans 2 mm. longum, apice emarginulatum; inferius obovatum 5 mm. longum, 4 mm. latum, apice lobis tribus rotundatis incisum. *Ovarium* lanceolatum, minute pilosum; stylus filiformis 7.5 mm. longus, basi pilosiusculus. *Capsula* obovata, 4 mm. longa, 3 mm. lata, basi in stipitem 2 mm. longam angustata, apice acuta, minutissime pilosula. *Semina* glaberrima, 1 pro loculo, lenticularia, 3 mm. diam. lata, 1 mm. spissa, laevia, nitida, flavescentia.

SOMALILAND: Hargeisa, 1,350 m., on sandstone rocks, fls. crimson, 13 Oct., No. 4255 (type in Kew Herb.).

*Hypoestes antennifer* S. Moore—F.T.A. 5: 245.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,250 m., 1 m. high, fls. white, Feb., No. 5119.

*H. Hildebrandtii* Lindau—F.T.A. 5: 249.

SOMALILAND: Hargeisa, 1,290 m., in tree Acacia formation, fls. white with mauve markings, Sept., No. 3906. Vernac.—*Ged Waraba*.—Also in Eritrea.

*H. triflora* (Forssk.) Roem. & Schultes—F.T.A. 5: 247.

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,460 m., on close grazed grass, fls. pink streaked with crimson, Feb., No. 5162.

*H. verticillaris* (Linn. f.) R. Br.—F.T.A. 5: 250.

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 25' N., 2,130 m., Mar., No. 5424.

*Ecbolium Anisacanthus* (Schweinf.) C.B. Cl.—F.T.A. 5: 238.

SOMALILAND: Hargeisa, 1,290 m., in open places on level ground, fls. blue, Sept., No. 3944. Camp 4, long. 44° 16' E., lat. 10° N., 1,050 m., fls. bright blue, Oct., No. 4362. Between Duwi and Afard, long. 44° 10' E., lat. 10° 8' N., 720 m., Oct., No. 4437.

*Ecbolium gymnostachyum* (Nees) Milne-Redhead, comb. nov. *Justicia gymnostachya* Nees in DC. Prodr. 11: 426 (1847). *E. parvibracteatum* Rendle—F.T.A. 5: 237.

SOMALILAND: Hargeisa, 1,380 m., on sandstone rocks, 2 m. high, fls. dull blue, Oct., No. 4254.—Endemic.

*E. viride* (Forssk.) Alston Fl. Ceylon 6: Suppl. 229 (1921).

SOMALILAND: Burmado, long. 43° 50' E., lat. 10° 13' N., 600 m., 30 cm., fls. green, Nov., No. 5436. Vernac.—*Alen medu*.

*Lepidagathis scariosa* Nees—F.T.A. 5: 122.

SOMALILAND: Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., fls. blue, Oct., No. 4119.

*Satanocrater somalensis* (Lindau) Lindau—F.T.A. 5 : 69.

SOMALILAND : Afard, long.  $44^{\circ} 8' E.$ , lat.  $10^{\circ} 10' N.$ , 510 m., fls. mauve, Oct., No. 4483. Vernac.—*Elas*.—Endemic.

*Rudtya fruticosa* Lindau—F.T.A. 5 : 175.

SOMALILAND : Goton, long.  $42^{\circ} 50' E.$ , lat.  $10^{\circ} 9' N.$ , 1,500 m., shrub 1.5 m., Nov., No. 4635. Mt. Wobleh, long.  $43^{\circ} 17' E.$ , lat.  $10^{\circ} 15' N.$ , 1,350 m., shrub 3 m., fls. orange-red with black markings, Feb., No. 4982. Buramo, long.  $43^{\circ} 12' E.$ , lat.  $10^{\circ} 1' N.$ , 1,200 m., shrub 2 m., fls. orange, Jan., No. 4883. Vernac.—*Elas*.

#### SELAGINACEAE.

*Hebenstreitia dentata* L.—F.T.A. 5 : 265.

ABYSSINIA : Mulkajibri, long.  $42^{\circ} 16' E.$ , lat.  $9^{\circ} 24' N.$ , 1,770 m., fls. white with orange marking, Feb., No. 5090.

#### VERBENACEAE.

*Lantana microphylla* Franch. Sert. Somal. 49 (1882).

SOMALILAND : Duwi Pass, long.  $44^{\circ} 15' E.$ , lat.  $10^{\circ} 15' N.$ , 1,050 m., fls. white, very aromatic, Oct., No. 4373.—Endemic.

*L. Petitiana* A. Rich.—F.T.A. 5 : 277.

SOMALILAND : Boundary, No. 4123. Afard, long.  $44^{\circ} 8' E.$ , lat.  $10^{\circ} 10' N.$ , 690 m., 0.3 m., fls. white, aromatic, Oct., No. 4446. Vernac.—*Ged hamer*.

*L. salvifolia* Jacq.—F.T.A. 5 : 276.

ABYSSINIA : Yuka, long.  $41^{\circ} 40' E.$ , lat.  $9^{\circ} 27' N.$ , 1,680 m., 1.5 m., fls. white, Mar., No. 5458. Kolubi-Harar Road, long.  $41^{\circ} 50' E.$ , lat.  $9^{\circ} 25' N.$ , 2,100 m., 1 m., fls. pink, leaves aromatic, Mar., No. 5463. Vernac.—*Kasi*.

*Lippia nodiflora* (Linn.) A. Rich.—F.T.A. 5 : 279.

SOMALILAND : Duwi, long.  $44^{\circ} 15' E.$ , lat.  $10^{\circ} 5' N.$ , 870 m., fls. lilac, Oct., No. 4394.

ABYSSINIA : Haramaia, long.  $42^{\circ} E.$ , lat.  $9^{\circ} 24' N.$ , 1,980 m., prostrate, fls. pinkish, Mar., No. 5465.

*Chascanum africanum* Moldenke in Fedde Repert. 45 : 136 (1938).

SOMALILAND : Barataga, long.  $44^{\circ} 1' E.$ , lat.  $10^{\circ} 5' N.$ , 1,290 m., 1 m., fls. cream, Oct., No. 4518. Gorfulai, long.  $43^{\circ} 38' E.$ , lat.  $10^{\circ} 16' N.$ , 480 m., 1 m., fls. pale yellow, Nov., No. 4550. Debrawen, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} 5' N.$ , 1,020 m., Feb., No. 4934. Vernac.—*Ubolölu*.

*C. sessilifolia* (Vatke) Moldenke in Phytologia 1 : 18 (1933). Bouchea sessilifolia Vatke—F.T.A. 5 : 283.

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., fls. white, Sept., No. 3992.—Endemic.

*Priva adhaerens* (Forssk.) Chiov. in Bull. Soc. Bot. Ital. 1923 : 115. *P. leptostachya* Juss.—F.T.A. 5 : 285.

SOMALILAND : Buramo, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} N.$ , 1,620 m., 30 cm., fls. white with crimson marks, Jan., No. 4851. Mt. Wobleh, long.  $43^{\circ} 17' E.$ , lat.  $10^{\circ} 15' N.$ , 1,260 m., fls. white and crimson, Feb., No. 4991.

*Verbena officinalis* Linn.—F.T.A. 5 : 286.

SOMALILAND : Buramo, 1,470 m., 1 m., fls. purple, Dec., No. 4721.

*Premna resinosa* Schauer—F.T.A. 5 : 289.

SOMALILAND : Near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 960 m., shrub 2 m., fls. cream, leaves very aromatic, berries edible, Oct., No. 4313. Vernac.—*Jero*.

*P. somaliensis* Bak.—F.T.A. 5 : 289.

SOMALILAND : Buramo, long. 43° 10' E., lat. 10° N., 1,500 m., shrub 1 m., fls. white and green, leaves aromatic, Jan., No. 4858.—Endemic.

*P. viburnoides* A. Rich.—F.T.A. 5 : 292.

SOMALILAND : Jifa Meidir, long. 43° 15' E., lat. 9° 43' N., 1,740 m., shrub 3 m., fls. greenish-cream, Jan., No. 4865.

ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,950 m., shrub 1 m., leaves aromatic, Feb., No. 5010. Vernac.—*Hadad*.

*Clerodendrum myricoides* (Hochst.) R. Br. ex Vatke—F.T.A. 5 : 310.

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 1,110–1,200 m., shrub 2 m., fls. blue, Oct., No. 4404.

ABYSSINIA : Fuyan Hunjuba, long. 42° 17' E., lat. 9° 26' N., 1,920 m., shrub 2 m., fls. blue, Feb., No. 5100. Vernac.—*Marari* (Somali); *Muserich* (Abyss.).

*Cyclocheilon eriantherum* (Vatke) Engl.—F.T.A. 5 : 274.

SOMALILAND : Afard, long. 44° 8' E., lat. 10° 10' N., 690 m., shrub 1 m., fls. pale pink, Oct., No. 4474. Dubar, long. 45° 5' E., lat. 10° 20' N., 300 m., shrublet 0.5 m., bracts pale green, fls. pink, Jan., No. 4772. Vernac.—*Hanja aseyi*; *Dainya*.

*C. somalense* Oliv.—F.T.A. 5 : 274.

SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., fls. pale pink, Oct., No. 4170. Also in Abyssinia.

#### LABIATAE.

*Micromeria biflora* Benth.—F.T.A. 5 : 452.

SOMALILAND : Simodi, long. 43° 30' E., lat. 10° 5' N., 1,740 m., fls. white, Nov., No. 4576.

ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,890 m., fls. pale pink, Feb., No. 5014. Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 3,000 m., fls. pink, Mar., No. 5319. Yuka, long. 41° 40' E., lat. 9° 25' N., 2,400 m., fls. pink, Mar., No. 5406.

*Thymus Serpyllum* Linn.—F.T.A. 5 : 454.

ABYSSINIA : Gara mulata Mt., 3,000 m., prostrate, fls. pink, Mar., No. 5318.

*Stachys aculeolata* Hook. f.—F.T.A. 5 : 466.

ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,580 m., fls. pink with crimson markings, Dec., No. 5353.

*Stachys glandulosa* Hutch. et E. A. Bruce, sp. nov., *S. aegyptiacae* Fres. remote affinis, sed fere glabra, foliis dimidio superiore denticulatis differt.

Suffrutex ad 20 cm. altus, valde aromaticus et ramosus; ramuli lignosi, basi 2–3 mm. diametro, glabrescentes, hornotini stellato-tomentelli, internodiis 1.5–2.5 cm. longis. *Folia* breviter petiolata, petiolo circiter 2 mm. longo stellato-tomentello; lamina anguste oblongo-lanceolata, basi cuneata, apice acuta, 1.5–3 cm. longa, 3–6 mm. lata, parte superiore denticulata, supra indistincte, infra dense glandulosa et nervis stellato-tomentellis; nervi laterales utrinsecus circiter 3, supra impressi, infra prominentes. *Verticilli* 2–6-flori, subsessiles; bracteae ovato-lanceolatae, 5–9 mm. longae, circiter 2.5 mm. latae, infra stellato-tomentellae, supra glabrae. *Calyx* anguste campanulatus, 10-nervius, 5-dentatus, extra glandulosus et stellato-tomentellus, dentibus deltoideis acutis 1.5 mm. longis, tubo 4 mm. longo fauce 3 mm. diametro. *Corolla* rosea, labio inferiore carmineo-maculata, extra stellato-tomentella, tubo cylindrico circiter 6 mm. longo calyci subaequali, labio superiore obovato 2.5 mm. longo, labio inferiore 3-fido 5 mm. longo lobo medio maximo semiorbiculari 2 mm. longo obtuso. *Stamina* inclusa. *Stylus* breviter 2-fidus. *Nuculae* ovoideae.

SOMALILAND: Jifa meidir, long. 43° 15' E., lat. 9° 43' N., 1,740 m., on granite kopje in evergreen scrub, 24 Jan. No. 4866 (type in Kew Herb.).

*S. Hildebrandtii* Vatke—F.T.A. 5: 468.

SOMALILAND: Wabwanak Park, Libah Hele Mts., long. 43° E., lat. 10° 20' N., 1,770 m., 1 m., Dec., No. 4,710.

*Nepeta azurea* R. Br.—F.T.A. 5: 460.

ABYSSINIA: Galla Pass, 2,250 m., 1 m., aromatic, fls. dark blue, Feb., No. 5120.

*N. Petitiana* Bak.—F.T.A. 5: 460.

ABYSSINIA: Gara mulata Mt., 2,790 m., 2 m., fls. blue, Mar., No. 5328.—Endemic.

*Leucas Jamesii* Bak.—F.T.A. 5: 478.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., 0.5 m., fls. white, Sept., No. 3928. Jalelo, long. 44° 14' E., lat. 9° 45' N., 1,080 m., 1 m., fls. white, Oct., No. 4293. Gorfulai, long. 43° 38' E., lat. 10° 16' N., 480 m., fls. white, Nov., No. 4554.—Endemic.

*L. thymoides* Bak.—F.T.A. 5: 482.

SOMALILAND: Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., fls. white, Nov., No. 4113. Simodi, long. 43° 30' E., lat. 10° 5' N., 1,200–1,740 m., fls. white, Nov., No. 4563. Buramo, long. 43° 10' E., lat. 10° N., 1,500 m., fls. white, Jan., No. 4860.—Endemic.

*L. urticifolia* R. Br.—F.T.A. 5: 489.

SOMALILAND: Hargeisa, No. 3905. Buramo, Varieto tug, long. 43° 10' E., lat. 10° 2' N., 1,080 m., fls. white, Feb., No. 4922.

*Lasiocorys argyrophylla* Vatke—F.T.A. 5 : 471.  
SOMALILAND : Boundary, long. 44° 15' E., lat. 8° 58' N., 1,260 m., fls. and leaves white, Sept., No. 4103. Debrawein, long. 43° 15' E., lat. 10° 3' N., 1,140 m., 2 m., woody with slender branches, fls. white, Nov., No. 4600. Vernac.—*Bukoro ari*.—Endemic.

*Ballota fruticosa* Bak.—F.T.A. 5 : 472.  
SOMALILAND : Libah Hele Mt., long. 43° E., lat. 10° 20' N., 1,560–1,790 m., shrub 3 m., fls. white, 3 Dec., No. 4694.—Endemic.

*Leonotis velutina* Fenzl var. *rugosa* Bak.—F.T.A. 5 : 492.  
ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,520 m., 2 m., fls. orange, Feb., No. 5157.

*Calamintha simensis* Benth.—F.T.A. 5 : 455.  
ABYSSINIA : Gara mulata Mt., 2,880 m., fls. pinkish, Mar., No. 5360 ; 5361.

*Ocimum americanum* Linn. Cent. Pl. 1 : 15 (1755). *O. canum* Sims—F.T.A. 5 : 337.

SOMALILAND : Debrawen, long. 43° 10' E., lat. 10° 5' N., 990 m., aromatic, fls. cream, Feb., No. 4931.

*O. hadiense* Forssk. Fl. Aegypt-Arab. 109 (1775). *O. menthaefolium* Hochst.—F.T.A. 5 : 340.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., shrublet, 0.5 m., very aromatic, fls. white, Sept., No. 3909. Deriodera, long. 42° 55' E., lat. 10° 3' N., 1,170 m., aromatic, fls. white, lilac-tinged, Nov., No. 4641. Vernac.—*Hibag* ; *Hrida*.

*O. staminosum* Bak.—F.T.A. 5 : 347.  
SOMALILAND : Debrawen, long. 43° 10' E., lat. 10° 5' N., 990 m., very aromatic, fls. white, lilac-tinged, Feb., No. 4940.—Endemic.

*O. suave* Willd.—F.T.A. 5 : 338.  
SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,890 m., 0.5 m., fls. white, Sept., No. 3927. Buramo, Dumuk tug, long. 43° 12' E., lat. 10° N., 1,170 m., 1 m., fls. cream, Jan., No. 4890.

*O. tomentosum* Oliv.—F.T.A. 5 : 341.  
SOMALILAND : Hargeisa, 1,290 m., 25 cm., fls. greenish cream, Sept., No. 4037.—Endemic.

*Becium obovatum* (Vatke) N.E. Br. var. *hians* N.E. Br.  
ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,950 m., fls. white and crimson, Feb., No. 5009.

*B. knyamum* (Vatke) N.E. Br. ex Broun & Massey Fl. Pl. Sudan 357 (1929).

SOMALILAND : Boundary, long. 43° 54' E., lat. 9° 2' N., 1,350 m., herb 30 cm., fls. white, Oct., No. 4229.

*Orthosiphon pallidus* Royle—F.T.A. 5 : 369.  
SOMALILAND : Buramo, Dumuk tug, long. 43° 10' E., lat. 10° N., 1,260 m., fls. white, Jan., No. 4878.

*O. somalensis* Vatke—F.T.A. 5 : 372.  
ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 27' N., 1,650 m., fls. pink, Mar., No. 5457.—Also in Somaliland.

*Endostemon tenuiflorus* (Benth.) Ashby in Journ. Bot. 1936 : 125.  
*O. tenuiflorus* Benth.—F.T.A. 5 : 366.

SOMALILAND : Ali Wein Mt., long. 45° 15' E., lat. 10° 24' N., 510 m., fls. white, lilac tinged, aromatic, Jan., No. 4819. Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,380 m., fls. white, mauve tinged, Oct., No. 4275. Vernac.—*Ged Laben*.—Also in Socotra and Arabia.

*Coleus albidus* Vatke in Linnaea 37 : 321 (1871-73).

SOMALILAND : Mt. Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,620 m., fls. blue, Feb., No. 4988.—Also in Abyssinia.

*C. barbatus* Benth.—F.T.A. 5 : 429.

SOMALILAND : Simodi, long. 43° 30' E., lat. 10° 5' N., 1,350-1,740 m., bushy herb 0.5 m., fls. blue, Nov., No. 4573. Vernac.—*Mtera had*.

*Coleus cicatricosus* Hutch. et E. A. Bruce, sp. nov. aspectu *C. Dazo* A. Chev., sed foliis cordatis crasse dentatis, inflorescentiis longe pilosis valde distincta.

Herba aromatica, viscida, usque ad 1 m. alta ; caulis crassus, glanduloso-tomentosus et longe pilosus, cicatricibus petiolorum disciformibus 4-5 mm. diametro notatus. *Folia* ovato-rotundata, basi profunde cordata, apice subacuta, 4-6 cm. diametro, crasse dentata, dentibus obtusis, utrinque molliter et patule pubescentia ; petioli 2-3 cm. longi, pubescentes. *Inflorescentia* paniculata, oblonga, usque ad 30 cm. longa, axi crasso longe piloso, ramis lateralibus racemiformibus 4-5 cm. longis basi cicatricibus petiolorum notatis ; pedicelli patentēs, 1-3 fasciculati, fere 1 cm. longi, breviter glanduloso-pubescentes. *Calyx* 8 mm. longus, glanduloso-puberulus, lobis inferioribus subulato-lanceolatis 3.5 mm. longis, lateralibus oblique ovatis acuminatis 2.5 mm. longis, lobo superiore late elliptico 4 mm. longo obtuso. *Corolla* atro-caerulea ; tubus medio geniculatus, vix 1 cm. longus ; labium adaxiale 4 mm. longum, leviter 3-lobatum, abaxiale cymbaeforme circiter 8 mm. longum. *Stamina* leviter exserta, filamentis inferne connatis. *Nuculae* lenticulares, brunneae, 1.25 mm. diametro.

SOMALILAND : Buramo, Dumuk tug, long. 43° 12' E., lat. 10° 1' N., 1,260 m., 1 m., plant aromatic, viscid, fls. dark blue, 29 Jan., No. 4880 (type in Kew Herb.). Vernac.—*Dalol*.

*C. edulis* Vatke—F.T.A. 5 : 425.

ABYSSINIA : Harar, long. 42° 19' E., lat. 9° 28' N., 2,280 m., fls. blue, Feb., No. 5203.

*C. igniarius* Schweinf.—F.T.A. 5 : 435.

SOMALILAND : Elmis, long. 44° 14' E., lat. 10° 22' N., 600 m., shrub 1 m., fls. rich blue, Oct., No. 4505. Auboba, long. 43° E., lat. 10° 1' N., 1,650 m., 0.5 m., very aromatic, Nov., No. 4631. Vernac.—*Dalol*.

*C. lanuginosus* Hochst.—F.T.A. 5 : 429.

SOMALILAND : Birda Mt., long. 43° E., lat. 10° 20' N., 1,620 m., fls. purplish blue, Nov., No. 4676.

ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,700 m., fls. purple, Mar., No. 5304 ; 5348.

*C. spicatus* Benth. in DC. Prodr. 12 : 71 (1848).

SOMALILAND : Simodi, 1,740 m., 0.3 m., fls. purple, stems reddish, Nov., No. 4575. Vernac.—*Mtera*.

*Capitanyia otostegioides* Guerke—F.T.A. 5 : 446.

SOMALILAND : Hargeisa, long. 44° E., lat. 9° 34' N., 1,290 m., succulent, fls. purple, Sept., No. 3995.

*Salvia Hochstetteri* Bak.—F.T.A. 5 : 459.

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,280 m., fls. blue, Feb., No. 5118.

*S. nudicaulis* Vahl var. *nubia* Bak.—F.T.A. 5 : 458.

ABYSSINIA : Gara mulata Mt., 2,820 m., fls. pale blue, Mar., No. 5329.

*Otostegia integrifolia* Benth.—F.T.A. 5 : 494.

ABYSSINIA : Kofajalo, long. 41° 51' E., lat. 9° 9' N., 2,250 m., 3 m., fls. white and yellow, Mar., No. 5277.—Also in Eritrea.

*O. repanda* Benth.—F.T.A. 5 : 495.

ABYSSINIA : Mulkajibri, long. 42° 16' E., lat. 9° 24' N., 1,650 m., 2 m., fls. white, aromatic, Feb., No. 5085. Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,640 m., 2 m., fls. white, Mar., No. 5341.

*Ajuga remota* Benth. in Wall. Pl. Asiat. Rar. 1 : 59 (1830).

ABYSSINIA : Galla Pass, long. 42° 19' E., lat. 9° 28' N., 2,250 m., fls. blue, Feb., No. 5117.

#### Monocotyledones.

#### POTAMOGETONACEAE.

*Potamogeton nodosus* Poir. Encycl. Suppl. 4 : 535 (1816).

ABYSSINIA : Haramaia, long. 42° E., lat. 9° 24' N., 1,980 m., fls. dull yellow, Mar., No. 5471.

*P. pectinatus* L.—F.T.A. 8 : 223.

ABYSSINIA : Haramaia, 1,980 m., fls. reddish, Mar., No. 5467.

#### COMMELINACEAE.

*Commelina albescens* Hassk.—F.T.A. 8 : 57.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., fls. pale blue, Sept., No. 3982. Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., fls. pale blue, Oct., No. 4189. Jebel Dubur, long. 44° 16' E., lat. 10° N., 1,050 m., fls. small white, Oct., No. 4359. Duwi, long. 44° 15' E., lat. 10° 5' N., 1,110–1,200 m., fls. purplish blue, Oct., No. 4400. Vernac.—*Bar*.

*C. benghalensis* Linn.—F.T.A. 8 : 41.

SOMALILAND : Duwi, 1,140 m., fls. sky blue, Oct., No. 4402. Vernac.—*Bar*.

*C. Forskalaei* Vahl—F.T.A. 8 : 44.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., prostrate, fls. bright blue, Sept., No. 4046.

ABYSSINIA : Harar, long. 42° 10' E., lat. 9° 20' N., 1,650 m., fls. blue, Feb., No. 5054. Vernac.—*Bar* (Somali). *Gorla gabis* (Abyss.).



- C. Kotschyi* Hassk.—F.T.A. 8 : 49.  
 ABYSSINIA : Harar, long.  $42^{\circ} 10'$  E., lat.  $9^{\circ} 20'$  N., 1,650 m.,  
 fls. blue, Feb., No. 5053. Vernac.—*Gorla gabis*.  
*Cyanotis somaliensis* C.B. Cl.—F.T.A. 8 : 83.  
 SOMALILAND : Buramo, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ}$  N., 1,740 m.,  
 fls. purplish blue, Jan., No. 4847. Vernac.—*Bar*.

#### LILIACEAE.

- Anthericum inconspicuum* Bak.—F.T.A. 7 : 480.  
 SOMALILAND : Debrawen, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ} 5'$  N., 1,020 m.,  
 fls. yellowish green, Feb., No. 4936.—Endemic.  
*Chlorophytum tordense* Chiov. Result. Sc. Miss. Stefan.-Paoli  
 Somal. Ital. 1 : 173 (1916).  
 SOMALILAND : Sigib Mt., long.  $43^{\circ} 11'$  E., lat.  $10^{\circ} 19'$  N., 1,470 m.,  
 leaves succulent, fls. white, purple tinged with brown stripe, Feb.,  
 No. 4996.—Endemic.  
*Aloe abyssinica* Lam.—F.T.A. 7 : 467.  
 SOMALILAND : Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,320 m.,  
 up to 2 m., growing in clumps, fls. yellow, red or orange, Sept.,  
 No. 3902. Vernac.—*Da-ar. Gabar*.  
*A. aethiopica* Berger in Engl. Bot. Jahrb. 36 : 60 (1905).  
 ABYSSINIA : Yuka, long.  $41^{\circ} 40'$  E., lat.  $9^{\circ} 25'$  N., 1,950 m.,  
 leaves mottled, fls. red, Mar., No. 5418.—Endemic.  
*A. Rivae* Bak.—F.T.A. 7 : 465.  
 SOMALILAND : long.  $43^{\circ} 16'$  E., lat.  $10^{\circ} 5'$  N., 1,040–1,140 m.,  
 slender stem up to 3 m., leaves bluish, margins white, fls. yellow  
 sometimes pink, Nov., No. 4597. Vernac.—*Daar Burug*.—Endemic.  
*A. somaliensis* C. H. Wright in Gard. Chron. 1899 : 430.  
 SOMALILAND : Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 35'$  N., 1,290 m.,  
 fls. pink, leaves mottled, Sept., No. 3996. Boundary, long.  $44^{\circ}$   
 $15'$  E., lat.  $9^{\circ}$  N., 1,230 m., infl. 1.5 m., fls. pinkish, leaves mottled,  
 Sept., No. 4074. Vernac.—*Daar Biyu*.—Endemic.  
*A. Steudneri* Schweinf.—F.T.A. 7 : 458.  
 SOMALILAND : Satoa tug, long.  $43^{\circ} 5'$  E., lat.  $9^{\circ} 59'$  N., 1,530 m.,  
 leaves mottled, Nov., No. 4618.  
 ABYSSINIA : Harar-Kofajalo Road, long.  $41^{\circ} 55'$  E., lat.  $9^{\circ} 9'$  N.,  
 1,860 m., acaulescent, fls. coral or yellow, Mar., No. 5272. Vernac.—  
*Daar* (Somali) ; *Red* (Abyss.).  
*A. trichosantha* Berger in Engl. Bot. Jahrb. 36 : 62 (1905).  
 SOMALILAND : Hargeisa, long.  $44^{\circ} 3'$  E., lat.  $9^{\circ} 33'$  N., 1,260 m.,  
 fls. pink, leaves erect, Sept., No. 4063.  
 ABYSSINIA : Boesesa valley, long.  $42^{\circ} 18'$  E., lat.  $9^{\circ} 29'$  N.,  
 2,400 m., leaves green turning reddish, fls. pink, Feb., No. 5177.  
 Gara mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,730 m., fls. coral,  
 unpleasant odour, Mar., No. 5335. Vernac.—*Daar Merodi* (Somali) ;  
*Erêt. Rêd* (Abyss.).—Also in Eritrea.

*Albuca abyssinica* Dryand.—F.T.A. 7 : 533.

ABYSSINIA : Gara mulata Mt., long.  $41^{\circ} 43'$  E., lat.  $9^{\circ} 12'$  N., 2,730 m., fls. yellow with green stripe, Mar., No. 5305. Gara mulata Mt., 3,180 m., Mar., No. 5367.

SOMALILAND : Buramo, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ}$  N., 1,440 m., leaves sometimes crisped at margins, fls. yellowish green with green stripe, Dec., No. 4724. Vernac.—*Ure tuku* ; *Gel adais*.

*A. chaetopoda* Chiov. Pl. Nov. vel minus Notae ex Aethiopia 3, n. 204, (1928).

SOMALILAND : Hargeisa, No. 4072. Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,290 m., fls. yellow, Sept., No. 4048. Vernac.—*Gel ahdeis*.—Endemic.

*Scilla somaliensis* Bak.—F.T.A. 7 : 557.

SOMALILAND : Boundary Pillar 93, long.  $45^{\circ} 9'$  E., lat.  $8^{\circ} 37'$  N., 990 m., fls. green and cream, Oct., No. 4188. Afard, long.  $44^{\circ} 8'$  E., lat.  $10^{\circ} 10'$  N., 690 m., fls. pale purple, Oct., No. 4470. Buramo, 1,380 m., leaves and scape mottled with purple, Jan., No. 4853. Vernac.—*Gel adais* ; *Gelka abadis*.—Endemic.

*Scilla carunculifera* Chiov. Result. Sci. Miss. Stefan.-Paoli Somal. Ital. 1 : 174 (1916).

SOMALILAND : Berbera, fls. green with purplish stripe, Jan., No. 4753. Vernac.—*Gel adais*.—Endemic.

*Dipcadi filamentosum* Medic. in Usteri Ann. Bot. 2 : 13 (1791).

SOMALILAND : Buramo, Dumuk tug, long.  $43^{\circ} 12'$  E., lat.  $10^{\circ} 1'$  N., 1,140 m., fls. pale green, Jan., No. 4894.

*Littonia obscura* Bak. in Kew Bull. 1894 : 342.

SOMALILAND : Berbera, fls. in bud greenish yellow, reddish when opened, Jan., No. 4758. Vernac.—*Mijereri*.—Also in Arabia.

*L. Hardeggeri* Beck—F.T.A. 7 : 566.

SOMALILAND : Berbera, Jan., No. 4758A.—Endemic.

*Asparagus asiaticus* Linn.—F.T.A. 7 : 432.

ABYSSINIA : Slopes of Sarerta Mt., long.  $42^{\circ} 19'$  E., lat.  $9^{\circ} 30'$  N., 2,400 m., fls. white, Feb., No. 5184. Vernac.—*Sariti*.

*A. falcatus* Linn.—F.T.A. 7 : 435.

SOMALILAND : Hargeisa, long.  $44^{\circ}$  E., lat.  $9^{\circ} 35'$  N., 1,380 m., Oct., No. 4264.

*Asparagus Gillettii* Chiov. sp. nov. (§*Asparagopsis*) affinis *A. albo* L. qui caules et ramos juveniles sulcatos et angulatos, intensius albos, pedicellorum partes basales 1.5–3 mm. longas habet.

Frutex erectus vel subscandens ; caules elati, internodiis 2–3 cm. longis superne 4–5 mm. diam. crassis cylindraceutis, ad nodos leviter anfractis ; rami solitarii vel 3–4-fasciculati, simplices, subhorizontaliter patentes, 15–40 cm. longi, leviter flexuosi, internodiis cylindricis estriatis cinereis prope apicem albicantibus nitidulis 4–15 mm. longis prope basin ramorum 1.5–2 mm. crassis : spinae ad nodos primum subulatae, postremo conico-subulatae 10–12 mm. longae, basi 2 mm. diam. crassae, seniores plus minusve ad vel parum supra basin arcuato-reflexae, superne rectae. *Cladodia* in specimine desunt ; in axillis superioribus spinarum inflorescentiae

umbellatae subsessiles, basi foliis bracteiformibus ovatis scariosis involucretae, floribus 5-24, adsunt; pedicelli 5-6 mm. longi, 0.75-1.25 mm. supra basin articulati. Flores monoclini; perigonium campanulatum, tepalis exterioribus anguste ellipticis 4-5 mm. longis 1 mm. latis apice rotundatis, interioribus spathulatis apice rotundatis basin versus sensim angustatis aequilongis. Stamina 6, filamentis subulatis tenuissimis 3.5-4 mm. longis glabris sursum sensim attenuatis apice capillaceis; antherae nigrae, ovatae, 0.5 mm. longae et latae, apice rotundato-obtusae, basi truncato-bilobae. Ovarium ovoideum, 2.5 mm. longum, 2 mm. latum, apice breviter conicum, in stilum vix 0.5 mm. longum manifeste trilobulatum productum, loculis triovulatis. Bacca subglobosa, immatura circ. 5 mm. diam.

SOMALILAND: Elmis, long. 44° 14' E., lat. 10° 22' N., 510 m., shrub 1 m. with weak trailing branches, 29 Oct., No. 4501 (type in Kew Herb). Vernac.—*Ergëg*.

*A. Pauli-Guilelmi* Solms-Laub.—F.T.A. 7: 428.

ABYSSINIA: Kolubi-Harar Road, long. 41° 50' E., lat. 9° 25' N., 2,190 m., fls. white, Mar., No. 5464. Vernac.—*Seriti*.

*A. racemosus* Willd.—F.T.A. 7: 434.

SOMALILAND: Buramo, long. 43° 10' E., lat. 10° N., 1,710 m., climber, fls. pale yellow, Jan., No. 4846. Vernac.—*Ergëg*.

*Merendera abyssinica* A. Rich.—F.T.A. 7: 558.

ABYSSINIA: Slopes of Sarerta Mt., long. 42° 19' E., lat. 9° 30' N., 2,400 m., fls. mauve, Feb., No. 5192.—Also in Arabia.

#### ARACEAE.

*Arisaema Schimperianum* Schott—F.T.A. 8: 143.

ABYSSINIA: Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,580 m., damp places on limestone, in ravine, fls. green, Mar., No. 5293.—Endemic.

#### TYPHACEAE.

*Typha angustifolia* Linn.—F.T.A. 8: 135.

SOMALILAND: Debrawen, long. 42° 40' E., lat. 10° 26' N., 920 m., 2 m., Nov., No. 4646. Near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 930 m., 4 m., Oct., No. 4328. Bir Dai, long. 44° 17' E., lat. 9° 55' N., 900 m., Oct., No. 4341. Vernac.—*Allala nudi*; *Alal medu*; *Alala*.

#### AMARYLLIDACEAE.

*Crinum ornatum* (Linn. f.) Burg Hexand. t. 18 (1831-4).

SOMALILAND: Afard, long. 44° 12' E., lat. 10° 8' N., 690 m., fls. white with faint pink stripe, Oct., No. 4441. Vernac.—*Ure tuku*.

*Haemanthus multiflorus* Martyn—F.T.A. 7: 388.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,110-1,200 m., fls. red, anthers yellow, Oct., No. 4399. Vernac.—*Ged adais*; *Ria Dararis*.

## HYPOXIDACEAE.

*Hypoxis* sp.

ABYSSINIA: Kondudo Mt., long. 42° 20' E., lat. 9° 27' N., 2,760 m., fls. yellow, Feb., No. 5221.

## IRIDACEAE.

*Moraea diversifolia* Bak.—F.T.A. 7: 339.

ABYSSINIA: Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,790 m., fls. mauve with yellow stripe, Mar., No. 5332.

## AGAVACEAE.

*Dracaena afromontana* Mildbr. Wiss Ergebn. Deutsch. Zent.—Afr. Exped. 2: 62, t. v, a-e (1910). *Dracaena reflexa* Lam. var. *nitens* Bak.—F.T.A. 7: 441, partly (as to E. African specimens).

ABYSSINIA: Galla Pass, long. 42° 19' E., lat. 9° 28' E., 2,400 m., 4 m., fls. cream, fruit orange, Feb., No. 5146.

*D. schizantha* Bak.—F.T.A. 7: 437.

SOMALILAND: Duwi, long. 44° 15' E., lat. 10° 5' N., 1,200 m., tree 3 m., Oct., No. 4415. Berdale Mt., long. 43° E., lat. 10° 20' N., 1,650 m., tree 5 m., Dec., No. 4685. Vernac.—*Morli*.

*Sansevieria abyssinica* N.E. Br. in Kew Bull. 1913: 306, et l.c. 1915: 241.

SOMALILAND: Hargeisa, 1,290 m., leaves flat, fls. grey, Sept., No. 4041. Vernac.—*Hig*.

*S. Ehrenbergii* Schweinf. ex Bak.—F.T.A. 7: 334. N.E. Br. in Kew Bull. 1915: 207.

SOMALILAND: Buramo, long. 43° 12' E., lat. 10° 1' N., 1,200 m., 1 m., fls. purplish green, berries orange, Jan., No. 4885. Vernac.—*Hig*.

*S. Phillipsiae* N.E. Br. in Hook. Ic. Pl. 30: t. 3000 (1913), et Kew Bull. 1915: 203.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 34' N., fls. greenish, leaves terete, mottled, Sept., No. 3997. Vernac.—*Hig*.—Endemic.

## VELLOZIACEAE.

*Vellozia Schnitzleinia* Bak.—F.T.A. 7: 409.

SOMALILAND: Dubriat Mt., long. 45° 10' E., lat. 10° 22' N., 300 m., fls. greenish-yellow, 3 Jan., No. 4790.—Also in Abyssinia.

## ORCHIDACEAE (by V. S. Summerhayes)

*Eulophia Petersii* (Rchb. f.) Rchb. f.—F.T.A. 7: 55.

SOMALILAND: Ridge S.E. of Auboba, long. 43° 4' E., lat. 9° 59' N., 1,590 m., to 1.5 m., leaves succulent, Nov., No. 4613. Vernac.—*Degwen*.

*E. Rueppelii* (Rchb. f.) Summerh. comb. nov.

*Lissochilus Rueppelii* Rchb. f.—F.T.A. 7 : 91.

ABYSSINIA : Harar, long. 42° 6' E., lat. 9° 18' N., 1,920 m., sepals green tinged with purple, corolla and column yellow, Feb., No. 5030. Vernac.—*Jibi shunku*.

*Polystachya Bennettiana* Reichb. f.—F.T.A. 7 : 116.

ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 25' N., 2,430 m., epiphyte, fls. white with yellow spot on lower side of upper petal, fragrant, Mar., No. 5429.—Also in Eritrea.

*Bonatea Phillipsii* Rolfe—F.T.A. 7 : 254.

SOMALILAND : Buramo, So Mt., long. 43° 10' E., lat. 10° N., 1,770 m., fls. yellowish green and white, strongly scented, Jan., No. 4848.—Endemic.

#### JUNCACEAE.

*Juncus Bachiti* Hochst.—F.T.A. 8 : 94.

ABYSSINIA : Gorla-Kolubi track, long. 41° 45' E., lat. 9° 22' N., 2,610 m., fls. dark brown, Mar., No. 5397.

#### CYPERACEAE.

*Scirpus corymbosus* Roth—F.T.A. 8 : 455.

ABYSSINIA : Haramaia, long. 42° E., lat. 9° 24' N., 1,980 m., infl. whitish, Mar., No. 5470. Vernac.—*Katema*.

*S. costatus* Boeck.—F.T.A. 8 : 451.

ABYSSINIA : Geldid, long. 41° 48' E., lat. 9° 15' N., 2,430 m., infl. black, Mar., No. 5383.

*S. setaceus* Linn.—F.T.A. 8 : 450.

ABYSSINIA : Gorla-Kolubi track, long. 41° 45' E., lat. 9° 22' N., 2,610 m., small, infl. whitish, Mar., No. 5402.

*Eleocharis caribaea* (Rottb.) Blake ex Forest Brown Occas. Papers Bishop Mus. Honolulu 9, 4 : 9 (1930). *E. capitata* R. Br.—F.T.A. 8 : 407.

SOMALILAND : Bir Dai, long. 44° 17' E., lat. 9° 55' N., 900 m., infl. white, Oct., No. 4339.

*Fuirena pubescens* (Lam.) Kunth—F.T.A. 8 : 463.

ABYSSINIA : Gorla-Kolubi track, long. 41° 45' E., lat. 9° 22' N., 2,610 m., infl. green, Mar., No. 5399.

*Fimbristylis ferruginea* Vahl—F.T.A. 8 : 417.

SOMALILAND : Bir Dai, long. 44° 17' E., lat. 9° 55' N., 900 m., infl. brownish, Oct., No. 4338. Vernac.—*Ghundo*.

*Cyperus bulbosus* Vahl—F.T.A. 8 : 352.

SOMALILAND : Buramo-Warieto tug, long. 43° 10' E., lat. 10° 2' N., 1,290 m., Jan., No. 4897.

*C. compactus* Lam.—F.T.A. 8 : 319.

SOMALILAND : Buramo, Dumuk tug, long. 43° 12' E., lat. 10° 1' N., 1,140 m., infl. white, Jan., No. 4891.

*C. conglomeratus* Rottb.—F.T.A. 8 : 324.

SOMALILAND : Afard, long. 44° 8' E., lat. 10° 10' N., 510 m., Oct., No. 4434. Berbera, Jan., No. 4738. Vernac.—*Atile*. *Darif*.

- C. cruentus* Rottb.—F.T.A. 8 : 325.  
 ADEN : 150 m., infl. reddish straw colour, Mar., No. 5512.  
*C. dichrostachys* Hochst.—F.T.A. 8 : 331.  
 ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 25' N., infl. green, Mar., No. 5419.  
*C. esculentus* Linn.—F.T.A. 8 : 355.  
 SOMALILAND : Near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 930 m., Oct., No. 4331. Gofur, long. 43° 38' E., lat. 10° 16' N., 540 m., Nov., No. 4558. Vernac.—*Go-ondo*.  
*C. rigidifolius* Steud.—F.T.A. 8 : 367.  
 ABYSSINIA : Yuka, 2,190 m., infl. blackish, Mar., No. 5426.  
*C. teneriffae* Poir.—F.T.A. 8 : 317.  
 SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,350 m., infl. brown, Sept., No. 4053. Vernac.—*Go-ouro*.  
*Mariscus coloratus* Nees—F.T.A. 8 : 381.  
 ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 25' N., 2,160 m., infl. green and white, Mar., No. 5409.  
*Juncellus laevigatus* C.B. Cl.—F.T.A. 8 : 308.  
 SOMALILAND : Near Eil Demet, long. 44° 17' E., lat. 9° 53' N., 930 m., Oct., No. 4304. Bir Dai, long. 44° 17' E., lat. 9° 55' N., 900 m., infl. white, Oct., No. 4340. Buramo, Dumuk tug, long. 43° 12' E., lat. 10° 1' N., 1,200 m., 1 m., Jan., No. 4884. Vernac.—*Da. Tugugoga*.  
*Pycnus aethiops* C.B. Cl.—F.T.A. 8 : 297.  
 ABYSSINIA : Geldid, long. 41° 48' E., lat. 9° 15' N., 2,430 m., infl. dark brown, Mar., No. 5384.  
*P. Mundtii* Nees—F.T.A. 8 : 294.  
 ABYSSINIA : Mulkajibri, long. 42° 16' E., lat. 9° 24' N., 1,620 m., infl. brownish, Feb., No. 5077.  
*Carex chlorosaccus* C.B. Cl.—F.T.A. 8 : 519.  
 ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 25' N., 2,130 m., infl. green, Mar., No. 5415.  
*C. Petitiana* A. Rich.—F.T.A. 8 : 522.  
 ABYSSINIA : Gara mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,820 m., infl. pale brown, Mar., No. 5310.  
*C. acutiformis* Ehrh. Beitr. 4 : 43 (1789).  
 ABYSSINIA : Geldid, long. 41° 48' E., lat. 9° 15' N., 2,430 m., Mar., No. 5380.  
*C. Negrii* Chiov. in Ann. Bot. Rom. 10 : 406 (1912).  
 ABYSSINIA : Yuka, 2,100 m., infl. greenish, Mar., No. 5421.—  
 Endemic.

#### GRAMINEAE (by C. E. Hubbard).

- Setaria nervosum* (Rottl. ap. Willd.) Stapf—F.T.A. 9 : 36.  
 SOMALILAND : Buramo, long. 43° 10' E., lat. 10° N., c. 1,500 m., Jan., No. 4855. Ohob Pass, long. 43° 13' E., lat. 10° 11' N., 1,200 m., Feb., No. 4945.  
*Lasiurus hirsutus* (Forssk.) Boiss. forma—F.T.A. 9 : 60.  
 SOMALILAND : Afard, long. 44° 8' E., lat. 10° 10' N., 690 m., Oct., No. 4471. Vernac.—*Darif*.

*Saccharum Ravennae* (Linn.) Murr.—F.T.A. 9: 96.

SOMALILAND: Near Eil Demet, long.  $44^{\circ} 17' E.$ , lat.  $9^{\circ} 53' N.$ , 930–1,080 m., Oct., No. 4327. Durdur tug, long.  $43^{\circ} 30' E.$ , lat.  $10^{\circ} 10' N.$ , 810 m., Nov., No. 4583. Vernac.—*Alal ad.*

*Chrysopogon Aucheri* (Boiss.) Stapf, var. *quinqueplumis* (Hack.) Stapf—F.T.A. 9: 160.

SOMALILAND: Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., Sept., No. 4012. Vernac.—*Daremo.*

*Bothriochloa pertusa* (Willd.) A. Camus—*Amphilophis pertusa* (Willd.) Nash ex Stapf—F.T.A. 9: 175.

SOMALILAND: Buramo, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} N.$ , 1,380 m., Jan., No. 4841. Vernac.—*Domar.*

*Eremopogon foveolatus* (Del.) Stapf—F.T.A. 9: 183.

SOMALILAND: Gorfulai, long.  $43^{\circ} 38' E.$ , lat.  $10^{\circ} 16' N.$ , 480 m., Nov., No. 4549. Berbera, Jan., No. 4736.

Aden, 210 m., Mar., No. 5492. Vernac.—*Sarem*; *Saren.*

*Andropogon cyrtocladus* Stapf—F.T.A. 9: 240.

SOMALILAND: Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 34' N.$ , 1,290 m., Sept., No. 3999. Vernac.—*Dur.*—Endemic.

*A. polyatherus* Hochst.—F.T.A. 9: 223.

ABYSSINIA: Harar, long.  $42^{\circ} 10' E.$ , lat.  $9^{\circ} 20' N.$ , 1,650 m., Feb., No. 5052. Slopes of Sarerta Mt., 2,400 m., Feb., No. 5185. Vernac.—*Sardo.*—Also in Eritrea.

*Cymbopogon divaricatus* Stapf—F.T.A. 9: 278.

SOMALILAND: Boundary Pillar 93, long.  $45^{\circ} 9' E.$ , lat.  $8^{\circ} 37' N.$ , 990 m., Oct., No. 4208. Vernac.—*Lebjir.*—Endemic.

*C. floccosus* (Schweinf.) Stapf—F.T.A. 9: 276.

SOMALILAND: Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., Sept., No. 3984. Burmado, long.  $43^{\circ} 50' E.$ , lat.  $10^{\circ} 13' N.$ , 780 m., Nov., No. 4543. Ohob Pass, long.  $43^{\circ} 13' E.$ , lat.  $10^{\circ} 11' N.$ , 1,200 m., Feb., No. 4944. Vernac.—*Arab jib*, *Hadaſ.*—Also in Eritrea.

*C. Schoenanthus* (Linn.) Spreng.—F.T.A. 9: 268.

SOMALILAND: Duwi, long.  $44^{\circ} 15' E.$ , lat.  $10^{\circ} 5' N.$ , 1,080 m., among rocks, Oct., No. 4371. Vernac.—*Aus Damer.*

*Hyparrhenia hirta* (Linn.) Stapf—F.T.A. 9: 315.

SOMALILAND: Hargeisa, 1,290 m., Sept., No. 3984A., Libah Mele Range, Kabal Gabat Pass, long.  $43^{\circ} E.$ , lat.  $10^{\circ} 20' N.$ , 1,110 m., Dec., No. 4679. Buramo-Warieto tug, long.  $43^{\circ} 10' E.$ , lat.  $10^{\circ} 2' N.$ , 1,080 m., Jan., No. 4914.

ABYSSINIA: Yuka, long.  $41^{\circ} 40' E.$ , lat.  $9^{\circ} 25' N.$ , 2,250 m., Mar., No. 5435. Vernac.—*Delan.*

forma *podotricha* Stapf.

ABYSSINIA: Harar, long.  $42^{\circ} 10' E.$ , lat.  $9^{\circ} 20' N.$ , 1,650 m., awns black, Feb., No. 5059. Vernac.—*Sav.*

*Heteropogon contortus* (Linn.) Beauv. ex Roem. et Schult.—F.T.A. 9 : 411.

SOMALILAND : Buramo, long. 43° 10' E., lat. 10° N., 1,590 m., Dec., No. 4717. Vernac.—*Eba tilis*. Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Sept., Nos. 4007, 4252. Vernac.—*Buri gudud*, *Aus gudud*.

*Digitaria abyssinica* (Hochst. ex A. Rich.) Stapf—F.T.A. 9 : 460 in part.

ABYSSINIA : Geldid, long. 41° 48' E., lat. 9° 12' N., 2,520 m., Mar., No. 5290.

*D. pennata* (Hochst.) Cooke—F.T.A. 9 : 472.

SOMALILAND : Buramo-Warieto tug, long. 43° 10' E., lat. 10° 2' N., 1,140 m., Jan., No. 4904.

*D. velutina* (Forssk.) Beauv. *D. horizontalis* Willd.—F.T.A. 9 : 436, in part.

SOMALILAND : Mt. Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,290 m., Feb., No. 4980.

*Eriochloa nubica* (Steud.) Hack. & Stapf. *E. acrotricha* (Steud.) Hack.—F.T.A. 9 : 499.

SOMALILAND : Hargeisa, 1,290 m., Sept., No. 3913A.

*Brachiaria glauca* Stapf—F.T.A. 9 : 550.

SOMALILAND : Gorfulai, long. 43° 38' E., lat. 10° 16' N., 540 m., Nov., No. 4557.

*B. leersioides* (Hochst.) Stapf—F.T.A. 9 : 551.

SOMALILAND : Buramo, Warieto tug, long. 43° 10' E., lat. 10° 2' N., Jan., No. 4899.

*Brachiaria somalensis* C. E. Hubbard, sp. nov., affinis *B. setigeræ* (Retz.) C. E. Hubbard, sed culmis foliisque pubescentibus, spiculis elliptico-ovatis vel ellipticis acutis vel subacutis, lemmate superiore longiore minute mucronulato differt.

*Gramen* annuum (?). *Culmi* geniculato-adscendentes, usque ad 60 cm. longi, graciliusculi, laxè ramosi, multinodes, tenuiter striati, pilis patulis brevibus pubescentes. *Foliorum vaginæ* internodiis subaequilongae vel breviores, demum laxae, striatae, dense pilosae, nodis villosae ; ligulae ad seriem densam ciliorum redactae ; laminae anguste lanceolatae, basi rotundatae, in acumen tenue attenuatae, 3.5–8.5 cm. longae, 5–12 mm. latae, planae, patulae, pilis brevissimis sericeis dense pubescentes vel supra glabrescentes, marginibus scaberulae et ciliolatae. *Inflorescentia* laxa, 7–10 cm. longa, e vagina summa demum longe exserta ; axis primarius dense pubescens, uno latere sulcatus. *Racemi* 6, laxiuscule spiculati, usque ad 5.5 cm. longi, solitarii, patentes ; rhachis gracillima, 0.5–0.6 mm. lata, triquetra, leviter flexuosa, brevissime pubescens ; pedicelli pubescentes, laterales brevissimi, terminales 1–3 mm. longi. *Spiculae* binae vel racemorum apicem versus solitariae, a dorso visae elliptico-ovatae vel ellipticae, acutae vel subacutae, 3.5–4 mm. longae, brevissime pubescentes, minutissime tuberculatae. *Gluma inferior* latissima (explanata), rotundato-truncata, 1–1.3 mm., longa, tenuissime membranacea, 1–3-nervis ; gluma superior latissime



elliptica et obtusa (explanata), spiculae aequilonga, dorso convexa, membranacea, 9-nervis. *Anthoecium inferum* sterile : lemma glumae superiori simile, sed dorso concavum vel plus minusve applanatum, 6-7-nerve ; palea elliptica, obtusa, 3 mm. longa, tenuiter membranacea, carinis anguste alatis. *Anthoecium superum* ♂ a dorso visum late ellipticum, a latere visum semi-ellipticum, 3 mm. longum : lemma et palea rigide coriacea, tenuissime transverse rugosa ; lemma minute mucronulatum, 5-nerve ; antherae 1.5 mm. longae.

SOMALILAND : Buramo-Warieto tug, 10° 2' N., 43° 10' E., in open woodland, on steep gneiss slopes, 1,140 m., 31.1.1933, Gillett 4903 (type in Kew Herb.).

*Paspalidum desertorum* (A. Rich.) Stapf—F.T.A. 9 : 585.

SOMALILAND : Duwi, long. 44° 15' E., lat. 10° 5' N., 1,050 m., Oct., No. 4368. Vernac.—*Gara gara* ad.

*P. geminatum* (Forssk.) Stapf—F.T.A. 9 : 583.

SOMALILAND : Buramo-Warieto tug, long. 43° 10' E., lat. 10° 2' N., 1,080 m., Feb., No. 4926.

*Paspalum vaginatum* Sw.—F.T.A. 9 : 570.

SOMALILAND : Buramo-Warieto tug, Feb., No. 4925.

*Urochloa panicoides* Beauv. U. Helopus (Trin.) Stapf—F.T.A. 9 : 595.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Sept., No. 3913.

*Echinochloa colonum* (L.) Link.—F.T.A. 9 : 607.

SOMALILAND : Debrawen, long. 42° 49' E., lat. 10° 26' N., 960 m., Nov., No. 4669. Vernac.—*Agar*.

*Panicum maximum* Jacq.—F.T.A. 9 : 655.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Sept., No. 3912. Jifa Uri, long. 43° 22' E., lat. 9° 42' N., 1,680 m., Jan., No. 4837.

ABYSSINIA : Harar, long. 42° 10' E., lat. 9° 20' N., 1,740 m., Feb., No. 5037. Vernac.—*Buldorleh* ; *Sar*.

*P. turgidum* Forssk.—F.T.A. 9 : 706.

SOMALILAND : Hargeisa, 1,290 m., Sept., No. 3979. Elmis, long. 44° 14' E., lat. 10° 20' N., 240 m., Oct., No. 4493. Vernac.—*Dungara*.

*Setaria verticillata* (Linn.) Beauv.—F.T.A. 9 : 824.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Sept., No. 3916.

*Rhynchelytrum repens* (Schumach.) C. E. Hubbard. R. roseum (Nees) Stapf & Hubbard.—F.T.A. 9 : 880.

SOMALILAND : Mt. Wobleh, long. 43° 17' E., lat. 10° 15' N., 1,020 m., Feb., No. 4993.

ABYSSINIA : Harar, long. 42° 10' E., lat. 9° 20' N., 1,740 m., Feb., No. 5042. Vernac.—*Sar*.

*R. villosum* (Parl.) Chiov.—F.T.A. 9 : 875.

SOMALILAND : Hargeisa, long. 44° E., lat. 9° 35' N., 1,410 m., Oct., No. 4266.

*Tricholaena Gillettii* C. E. Hubbard, sp. nov., affinis *T. teneriffae* (Linn.f.) Parl., a qua spiculis minoribus, glumarum pilis brevioribus differt.

*Gramen* perenne, 20–25 cm. altum, basi multiramosum. *Culmi* geniculato-adscendentes, graciles, teretes, ramosi, plurinodes, internodio summo (pedunculo) glabro laevi 6–9 cm. longo, internodiis inferioribus minute pubescentibus vel glabris multo brevioribus. *Folia* glauca; vaginae internodiis aequilongae vel demum paullo breviores, laxae, tenuiter striatae, ore pilis patulis paucis praeditae vel omnino glabrae, laeves; ligulae ad seriem ciliorum brevium redactae; laminae lineares, in apicem subobtusum callosum attenuatae, 2–5 cm. longae, 2–3.5 mm. latae, planae vel siccitate involutae, rigidiusculae, patulae, supra minutissime et obscure pubescentes, subtus glabrae, laeves. *Panicula* lanceolata vel oblonga, densiuscula, 2.5–5 cm. longa, 1–2 cm. lata, albido-viridis et purpureo-tincta; rhachis flexuosa, glabra, laevis; rami tenuiter filiformes, solitarii, flexuosi, glabri, laeves, basi divisi, inferiores usque ad 2 cm. longi; pedicelli flexuosi, laeves, 0.5–2 mm. longi, apice discoidei. *Spiculae* oblongae, 2.5–2.8 mm. longae, pilis patulis albis sericeis usque ad 2 mm. longis e tuberculis minutissimis ortis laxe pilosae. *Gluma inferior* rotundata, 0.3 mm. longa, tenuiter membranacea, longe pilosa, enervis; gluma superior ovata (explanata), obtusa, minute mucronulata, spiculae aequilonga vel paullo brevior, 5-nervis, laxe pilosa, marginibus ciliolata, membranacea. *Anthoecium inferum* ♂, spiculae aequilongum: lemma glumae superiori simile sed ovato-ellipticum, obtusum, minute mucronulatum; palea lanceolata, lemmate paullo brevior, tenuiter membranacea, apice ciliolata; antherae 1.5–1.7 mm. longae. *Anthoecium superum* ♀, ovatum vel anguste ovatum, obtusum, 1.5–1.6 mm. longum: lemma elliptico-ovatum (explanatum), obtusissimum, obscure nerve, laeve, nitens; palea oblonga, lemmate paullo longior; antherae 1 mm. longae.

SOMALILAND: Duwi, 10° 5' N., 44° 15' E., in tree Acacia—grass community, 1,020 m., 21.10.1932, *Gillett* 4395 (type in Kew Herb.).

*T. leucantha* Hochst.—F.T.A. 9: 915.

SOMALILAND: Jebel Wotni Mt., long. 45° 6' E., lat. 10° 18' N., 390 m., Jan., No. 4803.

ADEN: 450 m., Mar., No. 5486. Vernac.—*Agar*.

*Tricholaena setacea* C. E. Hubbard, sp. nov., affinis *T. Gillettii* C. E. Hubbard, sed foliorum laminis longioribus setaceis, paniculis laxioribus, glumarum pilis brevioribus differt.

*Gramen* perenne, laxe caespitosum, usque ad 45 cm. altum. *Culmi* erecti vel geniculato-adscendentes, graciles, rigidi, plus minusve ramosi, multinodes, glabri, laeves, internodiis inferioribus 1–5 cm. longis, internodio summo (pedunculo) usque ad 20 cm. longo. *Foliorum vaginae* arcte appressae, internodiis plerumque longiores, teretes, juveniles minute pubescentes, demum glabrae, laeves; ligulae ad seriem ciliorum brevissimorum redactae;

laminae angustissime lineares, in apicem setaceum attenuatae, 2-8 cm. longae, planae vel siccitate convolutae, 1-2.5 mm. latae, demum horizontaliter patentes, rigidiusculae, supra minute pubescentes, subtus glabrae, laeves. *Panicula* lanceolata vel ovata, laxa, 4-9 cm. longa, 2-6 cm. lata; rhachis gracillima, glabra, laevis; rami binati vel solitarii, laxe divisi, capillares, flexuosi, laeves, inferiores usque ad 4 cm. longi; pedicelli inaequales, usque ad 6 mm. longi, glabri, laeves, apice discoidei. *Spiculae* oblongae vel ovato-oblongae 2.5-3 mm. longae, pilis patulis albis usque ad 1.5 mm. longis e tuberculis minutissimis laxe pilosae, purpureo-variegatae vel pallide virides. *Gluma inferior* ovata et usque ad 0.3 mm. longa vel ad marginem minutam angustam redacta, tenuiter membranacea, longe pilosa, enervis; gluma superior elliptico-ovata (explanata), obtusa, plerumque minute mucronulata, spiculae aequilonga vel paullo brevior, membranacea, laxe pilosa, marginibus ciliolata, 5-nervis. *Anthoecium inferum* ♂, spiculae aequilongum; lemma glumae superiori simile sed latius; palea lanceolata, lemmati aequilonga, tenuiter membranacea, carinis prope apicem ciliolata; antherae 2.3 mm. longae. *Anthoecium superum* ♀, ovatum, acutum, 2-2.5 mm. longum; lemma elliptico-ovatum (explanatum), obtusum, tenuiter crustaceum, laevissimum, nitens, obscure nerve; palea lemmate paullo longior; caryopsis 1-1.5 mm. longa.

SOMALILAND: Burmado, 10° 13' N., 43° 50' E., on mountain top, lower part of tree Acacia—open wood, amongst rocks, 975 m., 2-11-1932, Gillett 4539 (type in Kew Herb). Vernac.—*Oro jar yer*.

*T. teneriffae* (Linn. f.) Parl.—F.T.A. 9: 913.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., Sept., No. 4006. Gorfulai, long. 43° 38' E., lat. 10° 16' N., 480 m., Nov., No. 4551. Vernac.—*Buldorle agar*; *Fordade*.

*Pennisetum clandestinum* Hochst. ex Chiov.—F.T.A. 9: 1009.

ABYSSINIA: Gorla, long. 41° 48' E., lat. 9° 20' N., 2,700 m., stamens protandrous, filaments nearly 4 cm. long, Mar., No. 5396.

*P. divisum* (Gmel.) Henrard. *P. dichotomum* (Forssk.) Delile—F.T.A. 9: 972.

SOMALILAND: Biji, long. 44° 5' E., lat. 10° 12' N., 420 m., Oct., No. 4513. Vernac.—*Dungara*.

*P. massaicum* Stapf, forma.—F.T.A. 9: 973.

SOMALILAND: Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., Oct., No. 4133. Vernac.—*Irdug*.

*P. setaceum* (Forssk.) Chiov.—F.T.A. 9: 1013.

SOMALILAND: Hargeisa, long. 44° E., lat. 9° 35' N., 1,410 m., Oct., No. 4259. Goton, long. 42° 54' E., lat. 10° 9' N., 1,410 m., Nov., No. 4634. Vernac.—*Aus Damer*; *Arab jib*; *Arab load*.

*Cenchrus ciliaris* Linn.—F.T.A. 9: 1072.

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Sept., Nos. 3911; 4008; 4036. Boundary, long. 44° 10' E., lat. 8° 57' N., 1,260 m., Sept., Nos. 4092; 4231. Vernac.—*Agar*, *Garde agar*, *Irdug*.

- C. pennisetiformis* Hochst. & Steud.—F.T.A. 9 : 1076.  
SOMALILAND : Dubriat Mt., long. 45° 10' E., lat. 10° 22' N.,  
c. 300 m., Jan., No. 4785.
- C. setigerus* Vahl.—F.T.A. 9 : 1077.  
SOMALILAND : near Eil Demet, long. 44° 17' E., lat. 9° 53' N.,  
930 m., Oct., No. 4325.
- Danthoniopsis barbata* (Nees) C. E. Hubbard—F.T.A. 10 : 74.  
SOMALILAND : Near Eil Demet, long. 44° 17' E., lat. 9° 53' N.,  
960 m., Oct., No. 4322. Vernac.—*Oro jar*.
- Phragmites communis* Trin.—F.T.A. 10 : 153.  
SOMALILAND : Gorfulai, long. 43° 38' E., lat. 10° 16' N., 540 m.,  
Nov., No. 4562. Vernac.—*Gul bilanwe*.
- Agrostis Schimperiana* Hochst. ex Steud.—F.T.A. 10 : 175.  
ABYSSINIA : Gara Mulata Mt., long. 41° 48' E., lat. 9° 12' N.,  
Mar., No. 5312.
- A. semiverticillata* (Forssk.) C. Christ.—F.T.A. 10 : 173.  
ABYSSINIA : Mulka Jibri, long. 42° 16' E., lat. 9° 24' N., 1,620 m.,  
floating in stream, Feb., No. 5082. Vernac.—*Sardo*.
- Aristida abnormis* Chiov. in Ann. Istit. Bot. Roma, 8 : 48 (1903).  
SOMALILAND : Milmil, long. 42° 42' E., lat. 10° 30' N., 900 m.,  
Nov., No. 4666.
- A. adoensis* Hochst. in Schimper, It. Abyss. Sec. III, No. 1806  
(1844).  
ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 25' N., 2,250 m.,  
Mar., No. 5434.
- A. adscensionis* Linn. Sp. Pl. 1 : 82 (1753).  
SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m.,  
Sept., No. 3983. Boundary, long. 44° 10' E., lat. 8° 57' N., 1,260 m.,  
Sept., No. 4088.
- Var. *aethiopica* Dur. & Schinz.  
SOMALILAND : Kabrih Bahr, long. 43° 44' E., lat. 10° 20' N.,  
480 m., Nov., No. 4547. Buramo, long. 43° 10' E., lat. 10° N.,  
c. 1,410 m., Jan., No. 4871. Vernac.—*Tinleh*.
- A. caerulescens* Desf. Fl. Atl. 1 : 109 (1798).  
SOMALILAND : Jalelo, long. 44° 14' E., lat. 9° 45' N., 1,080 m.,  
Oct., No. 4292. Vernac.—*Ma ruet*.
- A. hirtigluma* Steud. Syn. Pl. Glum. 1 : 144 (1854).  
SOMALILAND : Boundary Pillar 93, long. 44° 15' E., lat. 8° 58' N.,  
1,260 m., Sept., No. 4106. Jelelo, long. 44° 14' E., lat. 9° 45' N.,  
1,080 m., on schist rocks, Oct., No. 4296. Vernac.—*Harfo*; *Saren*.
- A. Kelleri* Hack. in Mém. Herb. Boiss. No. 20, 8 (1900).  
SOMALILAND : Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N.,  
990 m., Oct., No. 4169.—Endemic.
- A. mutabilis* Trin. & Rupr. Spec. Gram. Stip. 150 (1842) et  
in Mém. Acad. Imp. Sci. Pétersb. sér. 6, 6 : pt. 2, 150 (1843).  
SOMALILAND : Milmil, long. 42° 42' E., lat. 10° 30' N., 900 m.,  
Nov., No. 4667.

*A. papposa* Trin. & Rupr. l.c. 173.

SOMALILAND : Afard, long.  $44^{\circ} 8' E.$ , lat.  $10^{\circ} 10' N.$ , 540 m., Oct., No. 4460.

*A. migiurtina* Chiov. Pl. Nov. Aethiop. 29 (1928). (det. Chiovenda).

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 35' N.$ , 1,410 m., Sept., No. 4029.

The following numbers of *Aristida* have not yet been determined :—4664 ; 4750 ; 4761 ; 4783.

*Oryzopsis keniensis* Pilger in Notizbl. Bot. Gart. Berlin, 9 : 509 (1926).

ABYSSINIA : Yuka, long.  $41^{\circ} 40' E.$ , lat.  $9^{\circ} 25' N.$ , up to 1 m., Mar., No. 5422.

*Tragus Berteronianus* Schult. Syst. Veg. 2, Mant. : 205 (1824).

SOMALILAND : Las Dawan, long.  $45^{\circ} 17' E.$ , lat.  $10^{\circ} 20' N.$ , 200 m., Jan., No. 4810.

*T. racemosus* (Linn.) All. Fl. Pedem. 2 : 241 (1785).

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., Sept., No. 3929. Vernac.—*Nagard*.

*Latipes senegalensis* Kunth Rév. Gram. 1 : 261, t. 42 (1830).

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., Sept., No. 4010.

*Dignathia villosa* C. E. Hubbard in Kew Bull. 1936 : 293.

SOMALILAND : Boundary Pillar 93, long.  $45^{\circ} 9' E.$ , lat.  $8^{\circ} 37' N.$ , 990 m., Oct., No. 4201.

*Sporobolus Brockmanii* Stapf in Kew Bull. 1907 : 220.

SOMALILAND : Hargeisa, long.  $44^{\circ} 1' E.$ , lat.  $9^{\circ} 33' N.$ , 1,290 m., Sept., No. 4016. Vernac.—*Buldorle*.

*S. marginatus* Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 397 (1851).

SOMALILAND : Hargeisa, 1,290 m., Sept., No. 3918. Boundary, long.  $44^{\circ} 10' E.$ , lat.  $8^{\circ} 57' N.$ , 1,260 m., Sept., No. 4091. Vernac.—*Dih* ; *Timo na godleh*.

*S. Ruspolianus* Chiov. in Ann. Bot. Roma, 5 : 64 (1906).

SOMALILAND : Boundary Pillar 99, long.  $44^{\circ} 39' E.$ , lat.  $8^{\circ} 47' N.$ , 1,140 m., Oct., No. 4148. Vernac.—*Sifar*.

*S. robustus* Kunth Rév. Gram. 2 : 425, t. 126 (1831).

SOMALILAND : Dubar, long.  $45^{\circ} 5' E.$ , lat.  $10^{\circ} 20' N.$ , 120 m., Jan., No. 4766. Near Eil Demet, long.  $44^{\circ} 17' E.$ , lat.  $9^{\circ} 53' N.$ , 930 m., Oct., No. 4329.

*S. spicatus* (Vahl) Kunth Rév. Gram. 1 : 67 (1829).

SOMALILAND : Near Eil Demet, long.  $44^{\circ} 17' E.$ , lat.  $9^{\circ} 53' N.$ , 930 m., Oct., No. 4326. Gorfulai, long.  $43^{\circ} 38' E.$ , lat.  $10^{\circ} 16' N.$ , 510 m., Nov., No. 4556. Berbera, forming close mats, Jan., No. 4737. Vernac.—*Garo* ; *Debo welodle*.

*S. variegatus* Stapf in Kew Bull. 1907 : 218.

SOMALILAND : Boundary, long.  $44^{\circ} 10'$  E., lat.  $8^{\circ} 57'$  N., 1,260 m., Sept., No. 4082. Debrawen, long.  $42^{\circ} 49'$  E., lat.  $10^{\circ} 26'$  N., 960 m., forming low flat cushions, Nov., No. 4668. Vernac.—*Dihe*.—Endemic.

The following numbers of *Sporobolus* have not yet been determined :—4015 ; 4096 ; 4537 ; 4820 ; 4898 ; 4928 ; 5171.

*Harpachne Schimperii* Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 431 (1851).

ABYSSINIA : Boesesa Valley, long.  $42^{\circ} 18'$  E., lat.  $9^{\circ} 29'$  N., 1,950 m., Feb., No. 5171.

*Eragrostis aulacosperma* Steud. Syn. Pl. Glum. 1 : 269 (1854).

SOMALILAND : Hargeisa, 1,290 m., Sept., Nos. 3915 ; 3971 ; long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,290 m., Sept., Nos. 4014, 4055. Dobo Pass, long.  $43^{\circ} 15'$  E., lat.  $10^{\circ} 15'$  N., 1,200 m., Feb., No. 4963. Vernac.—*Warram bihi* ; *Dihi* ; *Tingleh*.

*E. hararensis* Chiov. in Ann. Istit. Bot. Roma, 6 : 163 (1896).

SOMALILAND : Berbera, prickly leaves, Jan., No. 4754, long.  $44^{\circ} 8'$  E., lat.  $10^{\circ} 10'$  N., 510 m., Oct., No. 4433. Vernac.—*Gubungub*.

*E. Schweinfurthii* Chiov. in Ann. Istit. Bot. Roma, 8 : 368 (1908).

ABYSSINIA : Gara Mulata Mt., long.  $41^{\circ} 48'$  E., lat.  $9^{\circ} 12'$  N., 2,670 m., Mar., No. 5344.

*Cypholepis yemenica* (Schweinf.) Chiov. in Ann. Istit. Bot. Roma, 8 : 357 (1908). *Eragrostis yemenica* Schweinf. in Bull. Herb. Boiss. 2 : App. 2, 41 (1894). *Leptochloa Appletonii* Stapf in Kew Bull. 1907 : 223.

SOMALILAND : Buramo, Dumuk tug, long.  $43^{\circ} 10'$  E., lat.  $10^{\circ}$  N., 1,260 m., Jan., No. 4872. Dobo Pass, long.  $43^{\circ} 15'$  E., lat.  $10^{\circ} 15'$  N., 1,200 m., Feb., No. 4966.

*Leptochloa obtusiflora* Hochst. in Flora, 28 : 203 (1855).

SOMALILAND : Hargeisa, long.  $44^{\circ} 1'$  E., lat.  $9^{\circ} 33'$  N., 1,440 m., Sept., No. 4059. Boundary, long.  $45^{\circ} 10'$  E., lat.  $8^{\circ} 57'$  N., 1,260 m., Sept., No. 4080. Mt. Wobleh, long.  $43^{\circ} 17'$  E., lat.  $10^{\circ} 15'$  N., 1,050 m., Nov., No. 4584. Vernac.—*Ausurun* ; *Buldorle*.

*Leptochloa rupestris* C. E. Hubbard, sp. nov., affinis *L. uniflorae* Hochst., sed culmis gracilioribus rigidioribus, foliorum laminis angustioribus, lemmatibus glumas plerumque aequantibus vel paullo brevioribus differt.

*Gramen* perenne (?). *Culmi* erecti vel e basi prostrata geniculato-adscendentes, usque ad 50 cm. alti, gracillimi, rigidi, teretes, laxi ramosi, multinodes, glabri, laeves. *Foliorum vaginæ* arcte appressæ, angustissimæ, glabrae, laeves, internodiis demum breviores ; ligulae membranaceae, laceratae, usque ad 1 mm. longae ; laminae anguste lanceolatae vel angustissime elliptico-lanceolatae, basi abrupte contractae, apice tenuiter acutae, 3–5.5 cm. longae, 3.5–7.5 mm. latae, planae, tenues, virides, glabrae, marginibus minute

scaberulae. *Inflorescentia* oblonga, laxa, 7-11 cm. longa, 2.5-3.5 cm. lata; axis primarius gracillimus, laevis. *Racemi* numerosi, gracillimi, secundi, plerumque solitarii, demum patuli, recti vel flexuosi, 2-2.8 cm. longi; rhachis applanata, 0.2-0.3 mm. lata, marginibus scaberula. *Spiculae* sessiles, laxe imbricatae, anguste oblongae vel demum hiantes, 2.3-2.7 mm. longae, pallide virides vel purpureo-tinctae, 1-florae; rhachilla supra anthoecium brevissime producta. *Glumae* subaequales, 2.3-2.7 mm. longae, carinatae, tenuiter acutae, membranaceae, 1-nerves, carina laeves vel parce scaberulae; inferior lanceolato-linearis (explanata); superior anguste lanceolata (explanata). *Lemma* lanceolatum et obtusum (explanatum), 2-2.5 mm. longum, carinatum, membranaceum, tenuiter 3-nerve, nervis nisi apicem versus breviter pubescens. *Palea* oblonga, truncata, lemmati aequilonga, glabra vel basin versus pilis paucis praedita. *Antherae* 1.5 mm. longae.

SOMALILAND: Mt. Wobleh, 10° 15' N., 43° 17' E., on gneiss slopes, in open wood—evergreen scrub, 1,290 m., 6-2-1933, *Gillett* 4981 (type in Kew Herb.); Jifa Uri, 9° 42' N., 43° 22' E., gneiss kopje, in evergreen scrub, 1,680 m., 10-1-1933, *Gillett* 4838.

*Oropetium capense* Stapf in Dyer, Fl. Cap. 7: 742 (1900).

SOMALILAND: Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,200 m., Feb., No. 4964.

*Chaetostichium minimum* (Hochst.) C. E. Hubbard in Hook. Ic. Pl. 34: t. 334I (1937).

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., Oct., No. 4163. Jebel Wotni Mt., long. 45° 6' E., lat. 10° 18' N., c. 390 m., on limestone slopes in open scrub, Jan., No. 4800.

*Microchloa Kunthii* Desv. Opusc. 75 (1831).

ABYSSINIA: Yuka, long. 41° 40' E., lat. 9° 25' N., 2,550 m., Mar., No. 5442.

*Cynodon Dactylon* (Linn.) Pers. Syn. Pl. 1: 85 (1805).

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Sept., No. 3930. Daba Bur, long. 43° 6' E., lat. 9° 59' N., 1,470 m., Nov., No. 4611. Buramo-Warieto tug, long. 43° 10' E., lat. 10° 2' N., Feb., No. 4927.

ABYSSINIA: Near Yuka, long. 41° 40' E., lat. 9° 25' N., 2,430 m., Mar., No. 5437.

*Enteropogon barbatus* C. E. Hubbard, sp. nov., affinis *E. Ruspoliano* Chiov. sed glumis inaequaliter bilobis, gluma inferiore longiore obtussissima, callo anthoecii pilis 4-5 mm. longis dense barbato differt.

*Gramen* perenne, dense caespitosum, circiter 70 cm. altum. *Culmi* erecti, graciles, inferne plus minusve compressi, superne teretes, simplices vel basin versus ramosi, 3-nodes, glabri, laeves. *Folia* glauca; vaginae minute asperulae, basales valde compressae

et acute carinatae, imbricatae, marginibus pilis longis tenuissimis laxe ciliatae, superiores internodiis breviores, subteretes, glabrae; ligulae ad seriem densam pilorum redactae, pilis albis sericeis patulis usque ad 8 mm. longis; laminae anguste lineares, in apicem setaceum tenuissimum longe attenuatae, usque ad 40 cm. longae, conduplicatae, vel explanatae et usque ad 3 mm. latae, glabrae, plus minusve minute asperulae vel laeves. *Spica* gracilis, recta vel leviter curvata, 11–18 cm. longa, secunda, pallide viridis vel purpureo-tincta; rhachis 0.8 mm. lata, dorso scaberula, basi villosa. *Spiculae* dense imbricatae, 7–8 mm. longae, 2-florae. *Glumae* membranaceae, 1-nerves, minute asperulae; inferior oblonga (explanata), obtusissima, 3–4.5 mm. longa, breviter et inaequaliter biloba, e sinu nonnunquam minute mucronata; superior anguste oblonga vel anguste oblongo-lanceolata (explanata), 5–8 mm., longa, inaequaliter biloba, lobis acutis angustis usque ad 1 mm. longis, mucrone usque ad 0.7 mm. longo e sinu oriente praedita. *Lemnata* anguste elliptica (explanata), apice anguste et acute biloba, lobis usque ad 1 mm. longis, arista usque ad 4 mm. longa e sinu oriente praedita, demum coriacea, 3-nervia, glabra, scabrida, primum 5–7 mm. longum, secundum 4 mm. longum; callus rotundato-obtusius, 0.6–0.8 mm. longus, pilis albis sericeis 4–5 mm. longis dense barbatus. *Paleae* lanceolato-lineares, acuminatae, truncatae, bimucronulatae, dorso minute hispidulae, carinis supra medium scaberulae, prima 5.5–7.5 mm. longa, secunda 4.5–5 mm. longa. *Antherae* 2–3 mm. longae. *Caryopsis* dorso visa anguste elliptica, 5.5 mm. longa.

SOMALILAND: Boundary Pillar 93, 45° 9' E., 8° 37' N., 990 m., 6–10–1932, Gillett 4196 (type in Kew Herb.). Vernac.—*Aus Gorun*.

KENYA COLONY: Northern Frontier Province, 1932, McKay 4. *Chloris myriostachya* Hochst. in Flora, 28: 204 (1855).

SOMALILAND: Boundary Pillar 93, long. 45° 9' E., lat. 8° 37' N., 990 m., infl. purplish, Oct., No. 4197. Vernac.—*Aro ane*.

*C. pycnothrix* Trin. Gram. Unifl. 234 (1824).

SOMALILAND: Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Sept., No. 3917.

*C. virgata* Sw. Fl. Ind. Occ. 1: 203 (1797).

SOMALILAND: Hargeisa, 1,290 m., Sept., No. 3914.

*Tetrapogon spathaceus* (Hochst.) Hack. ex Dur. & Schinz, Consp. Fl. Afr. 5: 864 (1894).

SOMALILAND: Boundary, long. 43° 54' E., lat. 9° 2' N., 1,350 m., infl. reddish, Oct., No. 4228. Vernac.—*Bulbiorle*.

*T. tenellus* (Roxb.) Chiov. in Ann. Istit. Bot. Roma, 8: 352 (1908).

SOMALILAND: Buramo-Warieto tug, long. 43° 10' E., lat. 10° 2' N., c. 1,170 m., infl. green and dark red, Jan., No. 4901. Boundary, long. 44° 10' E., lat. 8° 57' N., 1,290 m., Oct., No. 4117.



*T. villosus* Desf. Fl. Atl. 2 : 389 (1799).

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Sept., No. 4009. Buramo, 1,500 m., infl. reddish brown, Jan., No. 4854. Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,200 m., Feb., No. 4965. Vernac.—*Buri wena*.

*Coelachyrum poaeiflorum* Chiov. in Ann. Istit. Bot. Roma, 7 : 75 (1897).

SOMALILAND : Hargeisa, long. 44° 3' E., lat. 9° 33' N., 1,260 m., Sept., No. 4065. Dobo Pass, long. 43° 15' E., lat. 10° 15' N., 1,200 m., infl. blackish green, Feb., No. 4967. Duwi, long. 44° 15' E., lat. 10° 5' N., 1,050 m., Oct., No. 4369. Vernac.—*Domar*.

*Coelachyrum stoloniferum* C. E. Hubbard, sp. nov., affinis *C. poaeifloro* Chiov., sed spiculis laxè imbricatis, lemmatibus emucronatis minus pubescentibus differt.

*Gramen* perenne, usque ad 40 cm. altum, glaucum, stoloniferum ; stolones longi, ramosi, internodiis rigidissimis solidis glabris, e nodis innovationes breves edentes. *Culmi* erecti, graciles, 1–3-nodes, tenuissime striati, glabri, laeves. *Foliorum vaginae* glabrae, laeves, eae innovationum dense imbricatae, usque ad 8 mm. longae, basi stramineae, eae culmorum internodiis multo breviores, arcte appressae ; ligulae truncatae, usque ad 1 mm. longae, apice laceratae, membranaceae ; laminae lineares vel angustissime lanceolatae, subpungentes, usque ad 5 cm. longae, 2–2.5 mm. latae, planae, rigidae, demum patulae vel recurvatae, glabrae, marginibus cartilagineis albidis scaberulis. *Inflorescentia* 2.3–6 cm. longa, laxè ramosa ; axis primarius superne flexuosus, angulatus, leviter scaberulus. *Racemi* 4–6, solitarii, demum horizontaliter patentés, basi nudati, inferiores usque ad 5 cm. longi, ceteri gradatim breviores ; rhachis gracillima, angulata, angulis scaberulis ; pedicelli 0.2–2 mm. longi. *Spiculae* laxè imbricatae, oblongae, 4–8 mm. longae, 3–4 mm. latae, plerumque pallide flavido-et purpureo-variegatae, 6–14-florae. *Glumae* ovato-oblongae vel oblongo-ellipticae (explanatae), obtusae, aequales, 2.4–2.8 mm. longae, carinatae, membranaceae, 1-nerves, minutissime asperulae, carina superne scaberulae. *Lemmata* imbricata, late oblongo-elliptica (explanata), obtusa, subintegra vel minutissime biloba, 3 mm. longa (inferiora), membranacea, 3-nervia, minutissime asperula, infra medium secus margines dense breviter pubescentia et basin versus dorso minute sparse puberula. *Paleae* oblongae, truncatae vel obtusissimae, circiter 2.8 mm. longae (inferiores), membranaceae, marginibus angustis inflexis breviter pubescentes, dorso infra medium minute pubescentes. *Antherae* 1–1.5 mm. longae. *Caryopsis* oblongo-elliptica, 1.5 mm. longa, dorso valde compressa, concavo-convexa.

SOMALILAND : near Eil Demet, 44° 17' E., 9° 53' N., in sand near tug, 930 m., 17.10.1932, Gillett 4324 (type in Kew Herb.).

*Eleusine compressa* (Forssk.) Aschers. & Schweinf. ex C. Christ. in Dansk Bot. Arkiv. 4 : No. 3, 12 (1922).

SOMALILAND : Biji, long. 44° 5' E., lat. 10° 12' N., 420 m., on sand hills, Oct., No. 4512. Vernac.—*Hari hari*.

*Dactyloctenium aegyptium* (Linn.) Beauv. Agrost. Expl. Pl. xv. 10 (1812).

SOMALILAND : Gorfulai, long. 43° 38' E., lat. 10° 16' N., 540 m., infl. green, Nov., No. 4561. Vernac.—*Sudaho*.

*D. scindicum* Boiss. Diagn. Pl. Or. Nov. Sér. 2, 4 : 131 (1859).

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., Sept., No. 3903. Vernac.—*Sudaho, Sudeh*.

*Tripogon abyssinicus* Nees ex Steud. Syn. Pl. Glum. 1 : 301 (1854).

SOMALILAND : Jebel Wotni Mt., long. 45° 6' E., lat. 10° 18' N., c. 390 m., anthers purple, Jan., No. 4800.

*Enneapogon cenchroides* (Licht.) C. E. Hubbard in Kew Bull. 1934 : 119.

SOMALILAND : Barataga, long. 44° 1' E., lat. 10° 5' N., 660 m., Oct., No. 4526. Buramo, long. 43° 10' E., lat. 10° N., c. 1,410 m., Jan., No. 4870.

*E. elegans* (Nees) Stapf in Kew Bull. 1907 : 224.

SOMALILAND : Hargeisa, long. 44° 1' E., lat. 9° 33' N., 1,290 m., Sept., No. 4013. Ohob Pass, long. 43° 13' E., lat. 10° 11' N., 1,200 m., Feb., No. 4946.

*E. scaber* Lehm. Pugill. 3 : 41 (1831).

SOMALILAND : Ali Wein Mt., long. 45° 15' E., lat. 10° 24' N., 300 m., Jan., No. 4823.

*Ehrharta abyssinica* Hochst. in Flora, 38 : 193 (1855).

ABYSSINIA : Kondudo Mt., 42° 20' E., lat. 9° 27' N., 2,700 m., Feb., No. 5216.

*Phalaris arundinacea* Linn. Sp. Pl. 55 (1753).

ABYSSINIA : Gara Mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,580 m., Mar., No. 5356.

*Aeluropus lagopoides* (Linn.) Chiov. in Ann. Istit. Bot. Roma, 8 : 375 (1908).

SOMALILAND : Berbera, forming large mats, Jan., No. 4741. Vernac.—*Garo*.

*Poa leptoclada* Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 422 (1851).

ABYSSINIA : Gara Mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,520 m., Mar., No. 5288. Yuka, long. 41° 40' E., lat. 9° 25' N., 2,220 m., Mar., No. 5408.

*Bromus adoënsis* Hochst. ex Steud. Syn. Pl. Glum. 1 : 326 (1854).

ABYSSINIA : Gara Mulata Mt., long. 41° 45' E., lat. 9° 15' N., 3,000 m., bracts of infl. green and purple, Mar., No. 5370.

*Brachypodium flexum* Nees Fl. Afr. Austr. 456 (1841).

ABYSSINIA : Gara Mulata Mt., long. 41° 48' E., lat. 9° 12' N., 2,700 m., Mar., No. 5302.

var. *abyssinicum* Hochst. in Schimper. It. Abyss. Sect. 2, No. 674 (1842).

ABYSSINIA : Yuka, long. 41° 40' E., lat. 9° 25' N., 2,100 m., Mar., No. 5412.

PLATE IV.



SIR WILLIAM JACKSON HOOKER,  
K.H., F.R.S.

Director of the Royal Botanic Gardens, Kew,  
from 1841 to 1865.

(From the crayon drawing by Sir David  
Macnee, P.R.S.A., in the Kew Herbarium.)

# BULLETIN OF MISCELLANEOUS INFORMATION No. 3 1941

ROYAL BOTANIC GARDENS, KEW

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## IX.—CENTENARY OF THE ROYAL BOTANIC GARDENS, KEW.

The completion of the first hundred years of the existence of the Royal Botanic Gardens, Kew, as a Government Institution occurred on April 1st, 1941, for it was on April 1st, 1841, that Sir William Jackson Hooker, then Regius Professor of Botany in the University of Glasgow, took up his duties as the first Director of Kew after the Royal Gardens had been handed over by the Crown to become the National Botanic Garden.

The history of the Royal Gardens up to the year 1841 has been given by Sir W. T. Thiselton-Dyer in the Kew Bulletin (1891, pp. 279-327), and it is hoped, when conditions allow, to publish an account of the growth of the Gardens and of the various changes which have taken place during the past 100 years.

An article which was published, with some excellent pictures, in "Country Life" on March 29th, 1941, and which is here reproduced, with some alterations, by the courtesy of the Editor, gives a brief account of some of the additions to the Gardens and of the more important activities during the past century. A leading article on the subject was published in "The Times" on April 1st, and there were articles in "Nature" (April 5th, 1941, pp. 400-403), the Journal of the Royal Horticultural Society (lxvi, pt. 5, p. 154), and other publications. An address on the Centenary was given by the Director at a meeting of the Linnean Society on April 3rd.

Owing to the War no official celebration of this historic event could be held, but a letter of congratulation was received from Her Majesty Queen Mary, and letters and telegrams were sent by botanists and botanical institutions in Great Britain, Canada, South Africa, Australia, India, Fiji, and the United States of America. Some of these are here reproduced.

"Best wishes and congratulations on your April First Centennial."

(Dr. W. J. Robbins, Director, New York Botanical Garden.)

"Hearty Congratulations Best Wishes for many more Hundred Years of Kew in the service of Botany and Horticulture."

(Dr. George T. Moore, Director, Missouri Botanical Garden, St. Louis.)

"Warmest felicitations from the Fellows of the Royal Society of Canada to the Director and Curators of the Royal Botanical Gardens on occasion of Centenary. May the stimulus to botanical research which has been so great a contribution from Kew in the past be continued in ever increasing measure in the years to come."

(R. C. Wallace, President.)

"Continued success and prosperity to Kew the symbol of a science of peace one of the great forces in the development of the Empire and source of invaluable contributions to the health and welfare of mankind on behalf of all Canadian Botanists."

(H. T. Gussow, Dominion Botanist, Ottawa.)

"Hearty Congratulations on Kew Centenary from Cambridge Botany School and Garden Staff."

(Professor F. T. Brooks, Professor of Botany, Cambridge.)

"Heartiest congratulations. May Kew's second Century be as auspicious as its first."

(Department of Botany, British Museum.)

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From Dr. E. D. Merrill, Director, Arnold Arboretum, Harvard University:—

"I take this opportunity of expressing to you, to the staff, and to the administrative bodies concerned with the institution, our appreciation of the outstanding services that Kew has rendered, and is still rendering, to botanical and horticultural sciences from a World standpoint. Botanists and botanical institutions everywhere are under a tremendous debt of gratitude to the institution, to you as Director, and to your very able predecessors from the time of Sir William Hooker, for outstanding services rendered. It is almost a trite saying that Kew is the storehouse of World botany, for it is just as true today as it was when the expression was originally used many years ago.

We all naturally regret the combination of circumstances that has made this, and the past year, peculiarly difficult for the institution, and we regret, more than all else, the extensive damage that has been caused by indiscriminate bombing. Again, we regret that this centenary could not have been celebrated in a manner which such an important event deserves, but it is, of course, understandable why the date should be allowed to pass without international recognition of its importance."

From Dr. C. Stuart Gager, Director, Brooklyn Botanic Garden :—

“ Brooklyn Botanic Garden wishes to express to Kew its hearty congratulations and felicitation on the rounding out of the first hundred years of this institution, which I think may be properly designated not only as the leading botanic and horticultural institution of the Empire but also as the most important botanic garden in the world. What a pity it is that the present situation in Europe makes it impossible for you to hold a celebration in keeping with the place of Kew in the botanical world and the value of its accomplishments to botany and horticulture !

May I add my personal congratulations to you as the Director of Kew to these best wishes of the officials and staff of the Brooklyn Botanic Garden.”

From Professor R. H. Compton, Director, National Botanic Gardens, Kirstenbosch :—

“ First let me offer you most cordial congratulations on the centenary of Kew. Kew is *the* world's botanic garden, *par excellence*, and Kirstenbosch is one of the many institutions which have derived inspiration, help and encouragement from Kew. We feel deep gratitude to Kew, whose very existence and success has made possible the establishment of so many other botanic gardens, Kirstenbosch among them. And we pay a high tribute of admiration to Kew for the outstanding work of its first century in systematics and horticulture and in the enrichment of life in many aspects.

May I add my very sincere personal congratulations to you and your staff for the courageous way in which you are meeting the difficulties of the present time, and express the fervent hope that the war may spare the irreplaceable treasures of Kew.”

From Sir William Wright Smith, Regius Keeper, Royal Botanic Garden, Edinburgh :—

“ In these troublous times one is often guilty of acts of omission for which there is little or no excuse. How it came about that I did not send a letter of congratulation on the Centenary of Kew I cannot account for. I trust however to be forgiven and to make amends. Kew stands with me always in the highest regard and my good wishes if somewhat belated are of the most sincere. The relations between Kew and Edinburgh—*Consule Hill atque Consule W. Smith*—have been all along of the happiest and there is still the prospect of that slight extension of our service and so *finis* is not written just yet. I would that I had written earlier but be so good as to enrol me still amongst those who tendered their felicitations in token of admiration.”

From Dr. J. Walton, Regius Professor of Botany, The University, Glasgow :—

“ I notice in ‘ Nature ’ an announcement that you are to address the Linnean Society on the Centenary of Kew. Permit me to send respectful greetings to the Royal Botanic Gardens from the Department of Botany in the University of Glasgow on the Centenary of the departure of Sir W. J. Hooker from Glasgow to take up his duties at Kew. As a humble successor to the Chair which he occupied here I can perhaps rightly claim the privilege of sending these greetings.”

From Sir William Collins, Chairman, Chelsea Physic Garden Committee :—

“ May the Chelsea Physic Garden join in Centenary salutations to Kew, remembering the association through Aiton, the pupil of Miller, of the two Botanic Gardens? I am sure all the members of the Chelsea Garden Committee would wish to join in felicitations to their highly esteemed colleague of Kew who so ably presides over that royal demesne.”

From Mr. Eric Macfadyen, Chairman, The Imperial College of Tropical Agriculture :—

“ I have only just learned of the Kew Centenary. Although the times we are living in must preclude the public celebrations by which the date would normally have been distinguished, admirers of Kew in all parts of the world will wish to mark their grateful appreciation of the incomparable record of service to botanical science of your great Institution from the days of Hooker to those of Hill ; and I know that our colleagues on the Governing Body would wish to be numbered among those who record their acknowledgment of the occasion. In their name may I offer you, on behalf of the Royal Botanic Gardens, our sincere felicitations and best wishes for the next one hundred years? ”

From Charles Alexander Hill, Chairman, and Arthur Mortimer, Secretary, The Wholesale Drug Trade Association :—

“ The Council and members of the Wholesale Drug Trade Association send their congratulations to you on the occasion of the one hundredth anniversary of the opening of the Royal Botanic Gardens to the public.

This Association realises, perhaps more keenly than other bodies, the value of Kew to the Community and the Empire, and the help that Kew has given to the commercial side, not only with regard to assisting the Empire with plants of all kinds for cultivation, but also the help which it has given to the drug trade at home in getting the best results from the vegetable herbs and drugs that are grown and imported.

We are grateful for all that has been done and send our very best wishes for the future success and prosperity of these historic Gardens.”

From the Bishop of Kingston :—

“ In the absence of the Diocesan (Bishop of Southwark) on behalf of the Diocese, I write to congratulate you and to say we share in your happiness. It is wonderful what the Gardens have done and are doing. They have made a real contribution to the life of the Empire. Long may they live and grow ! ”

From Councillor Miss Mabel Lawrie, J.P., Mayor of Richmond :—

“ On behalf of the Burgesses of this Borough I send you hearty congratulations upon the occasion of the Centenary of Kew Gardens, as a Government institution.

During all the past years, with its great contribution to botanical research, Kew Gardens has been a tie binding the Motherland to the Dominions, and as such, is a heritage which must be saved to us.

Kew Gardens is also, to many, a haven of peace, and perhaps, in these troublous times, more appreciated for that reason.

May the work and the blessings of Kew Gardens be continued for future generations.”

(Reprinted from “ Country Life.”)

The Royal Botanic Gardens, Kew, have grown gradually to their present size and importance without having been conceived on any premeditated plan, and as they may be seen to-day, they are very largely the result of Sir William Jackson Hooker's foresight and enterprise.

The original Botanic Garden was started by Princess Augusta about the year 1760, and it was after her death, between the years 1772-1820, that so much was done by Sir Joseph Banks, working with George III, in building up the collections by sending out collectors all over the world, in developing the resources of the British possessions overseas, and training men to take charge of the various Colonial botanic gardens. On the deaths of George III and Sir Joseph Banks in 1820 the Gardens gradually fell into a state of neglect and their abandonment was seriously considered, but, thanks to the appointment of a committee, of which Dr. J. Lindley and Sir Joseph Paxton were the principal members, it was finally decided, in 1840, to take them over as a national institution. Sir William Hooker, then Regius Professor of Botany at the University of Glasgow, was appointed Director, and took up his duties on April 1, 1841.

When Sir William was appointed, the Botanic Garden consisted of only 11 acres. In the following year, thanks to the interest of Queen Victoria, he was able to get 4 acres added near the present Main Gate, and two years afterwards Her Majesty granted him 47 acres out of the pleasure grounds, and in 1846, 14 further acres were added, which had formerly been the Royal Kitchen Garden. Thus, in the course of five years after his appointment the Garden under his charge had extended to 76 acres.



Not long after this he was given control over the pleasure grounds, which extended as far as the Old Deer Park and included the Queen's Cottage grounds (opened to the public in 1897). The whole area included in the Kew demesne now amounts to a little over 318 acres.

With the acquisition of the extra ground, Sir William Hooker at once set to work to develop the Royal Botanic Gardens. The 4 acres added near No. 1 House enabled the new entrance gates on Kew Green to be erected from the designs of Decimus Burton, 1845, and with the other additions Sir William was able to put forward his proposals for the building of the Palm House, for which Decimus Burton was also the architect. The Palm House was erected in 1844-48 on a terrace built up partly on the site of the old pond. Nesfield was then called into consultation with regard to the general lay-out of the grounds. He designed the Broad Walk from the Old Orangery to the pond and its continuation at right angles, leading to the new Main Gates on Kew Green. The design was centred on the Palm House, and Nesfield embanked the pond on its present lines, and laid out the parterre between it and the Palm House, and also the formal semi-circular garden enclosed by a yew (now holly) hedge with conical holly bushes on the western side; and he opened up the three vistas into the pleasure grounds towards Sion House, the Pagoda, and the old cedar tree to the north-west.

Though the pleasure grounds were separated from the Botanic Gardens by a light iron fence, which ran from the Unicorn Gate in a semicircle round behind the Palm House to Kew Palace grounds, Sir William was also able to prepare schemes for their general development as part of the Gardens, since, fortunately, he had control over both areas.

He had for some time put forward proposals for the erection of a house for New Holland plants, which resulted in the building of the Temperate House. This, like the Palm House, was designed by Decimus Burton, but only the central portion and the two octagons were completed in Sir William's time, in 1862, and it was not until 1899 that the second of the two wings—the northern one—was erected. The Temperate House is built on a terrace made up of the material excavated from the lake which was partly made by Sir William. As soon as he became Director he opened the Gardens to the public and did all he could to make them instructive and attractive to visitors.

Sir William came to Kew with very clear and definite ideas as to what a national botanic garden should include, and one of these was a museum for the display of the economic products derived from the vegetable kingdom. He was fortunate in being able to interest Queen Victoria in the project, and the Royal Fruit Store, the present Museum No. 2, was handed over to him for the purpose. This was quickly filled with his own collections and with many gifts from outside, and in 1847 the Museum was opened—the first Museum of Economic Botany to be founded in this country. So greatly did

the collections in the Museum grow that it became necessary to erect a new building, and No. 1 Museum by the side of the pond was built in 1857. Later, a third museum was added when the old Orangery became available, after the building of the Temperate House, and this was devoted to a display of colonial timbers in 1862. Since then, a further addition to the museum accommodation at Kew has been made in Cambridge Cottage, the present No. 4 Museum, which was handed over to the Gardens by King Edward VII in 1905.

A herbarium and a library, Sir William also pointed out, were essential constituents of a botanic garden, but Kew possessed neither. Sir William, however, generously placed his own extensive collection of herbarium specimens and books at the disposal of all visiting botanists. It was not until the year 1852, when the Director was given an official residence, that the present Herbarium building, which had formerly been the residence of the King of Hanover, was handed over for the Herbarium and Library. This building, it is interesting to recall, had previously been used by Sir Joseph Banks for his herbarium, which he bequeathed to the nation. This on his death was moved from Kew and formed the nucleus of the British Museum botanical collection. The Herbarium and Library have grown very greatly since Sir William's day; a wing was built out at the back of the original house by Sir Joseph Hooker in 1877, a second wing to the south was added during the directorship of Sir William Thiselton-Dyer in 1902-03, and the last extension—a large wing with four floors, parallel to the original one—was erected in 1932.

In addition to a herbarium, library and museums, a botanic garden should have a laboratory for physiological and other botanical investigations. This valuable addition was made in the years 1875-76, thanks to the munificence of Dr. T. J. Phillips Jodrell.

The gardens, therefore, have now all the necessary adjuncts for the conduct of the various branches of botanical work.

A very interesting addition was made to the Gardens in 1882, when Miss Marianne North presented her Gallery. She filled it with a remarkable collection of about 850 oil paintings of plants and flowers, which she had made all over the world between 1872 and 1885.

Mention may be made of a few other additions, which are of some historical interest, one being the Tropical Water-lily House, No. 15, which was built in 1852 for the display of the recently introduced *Victoria Regia* water lily. A rock garden was made by Sir Joseph Hooker in 1882, by the old ice well, where the hardy ferns are now planted, and he prophesied that this would no doubt soon become one of the most popular branches of modern horticulture. A few years later the need for a more extensive rock garden was put forward, and thanks to the presentation of the collections of Mr. George Joad of Wimbledon, the present Rock Garden, modelled on a dry Pyrenean valley, was built. This has been considerably

extended, especially at the northern end, in recent years. The stone at the southern end is limestone, while the newer part at the northern end has been built up of Sussex sandstone. The Alpine House was erected in 1887—this being an innovation at the time; owing to its popularity it was enlarged in 1891 and re-built on a larger scale in 1939. Two other recent additions are of special note, one being the Sherman Hoyt Cactus House with its painted background of the Mohave Desert, which was presented by Mrs. Sherman Hoyt and completed in 1932, and the South African Succulent House, presented in 1935 in commemoration of the Silver Jubilee of King George V.

The lectures to the student gardeners were started by Sir William Hooker in 1859, and have been continued and much extended since then.

Two of the enterprises with which Kew has been intimately concerned and which have had far-reaching effects throughout the Empire are the introduction of *Cinchona* to India in 1861 and of Para Rubber to Malaya about 1876.

Various other enterprises, less spectacular, but of considerable importance, have taken place since those times. One of the functions of Kew has been to send plants of economic and horticultural value to all parts of the Dominions and Colonies, where conditions might be suitable for their cultivation. These have included Coffee (*C. liberica* and *C. stenophylla*); Pineapples; Mangosteen to the West Indies; Almonds collected in Majorca and sent to Cyprus; the Abyssinian Teff Grass, *Eragrostis abyssinica*, sent to South Africa; Tung Oil seeds (*Aleurites Fordii* and *A. montana*) to various suitable Colonies; Pelargoniums for their oil, to Kenya; Chaulmoogra (*Hydnocarpus*) to the West Indies and Malaya; *Artemisia* (a valuable source of Santonin) to various Colonies; *Derris*, *Pyrethrum*, *Lonchocarpus* and *Tephrosia* and other insectical plants to suitable places; Mahogany seed to India; Cricket-bat Willows to Canberra and elsewhere.

Among the most recent of these enterprises have been the sending of seeds of various species of *Passiflora* and plants of varieties of *Manihot* to Amani, in connection with the work being undertaken there to try and raise strains resistant to virus disease. Wild and cultivated Bananas have also been collected in the East and, after being propagated in the special quarantine house at Kew, have been sent to the Imperial College of Tropical Agriculture, Trinidad, in connection with the work that is being done there in breeding immune types to combat the Panama Disease of bananas, which is so seriously affecting the banana industry.

Kew is not only a place for healthy recreation and enjoyment, but it is also a garden for serious botanical study, and every effort is made to render the collections as educational as may be possible, both in their arrangement and by appropriate labelling. The tropical epiphytic ferns, for instance, have been planted out on

tree trunks much as they occur in their native forests ; and in the Tropical Fern House the effect of a tropical forest has been fairly successfully reproduced. Then again, both the Sherman Hoyt house and the South African succulent house display the plants growing among rocks similar in colour and nature to those among which they occur in their native countries.

For the botanical student there are the unrivalled collections in the Herbarium, Library, and Museums, the specimens in the Herbarium now numbering about 5,000,000 ; while the Jodrell Laboratory offers facilities for students who may wish to carry out physiological and other researches in connection with the specimens growing in the Gardens.

The various " Floras " of the Dominions and Colonies, the need for which was outlined by Sir William Hooker, have been prepared at Kew.

The work of Kew is pre-eminently scientific, but it is also possible for a non-scientific visitor to derive full enjoyment from the general beauty of the Gardens, for, though the trees and shrubs are mainly planted in their proper systematic order, the landscape effect has also been fully preserved.

To quote the words of Sir William Thiselton-Dyer—Kew " has itself grown and flourished under its past and present Chiefs . . . not so much from its dependence upon their merits, but rather because the principles of its administration have been essentially British and practical.

" It has steadily set itself to do every kind of public work which is connected with botanical science.

" It was never launched with a theoretically complete equipment and constitution, but it has slowly earned every advantage that has been conceded to it, and, as its labours have been enlarged, so its capacity for their performance has been increased."

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## X.—NOTES ON SACCHARUM AND ERIANTHUS SMUTS.

B. B. MUNDKUR (Imperial Agricultural Research Institute, New Delhi).

In a recent paper (1939), I have shown that the culmicolous smuts attacking species of the genera *Saccharum* and *Sclerostachya* comprise two species, *Ustilago scitaminea* Sydow and *U. consimilis* Sydow, and two varieties, *U. scitaminea* var. *Sacchari-Barberi* Mundkur and *U. scitaminea* var. *Sacchari-officinarum* Mundkur. The ovaricolous smuts attacking species of the genera *Saccharum* and *Erianthus* have now been investigated.

***Cintractia pulverulenta*** Cooke & Massee apud Cooke in Grevillea, 18, 34 (1889).

This species was described [loc. cit.] on an "*Erianthus*" collected by C. B. Clarke in Assam. The type specimen in Herb.

Kew. bears the name "*Sorosporium pulverulentum* Cke. and Mass.", but a portion of the same specimen in Massee's herbarium in the New York Botanic Garden is labelled "*Cintractia pulverulenta*," under which binomial the species was published. As Sydow (1924) had expressed a doubt regarding the identity of the host, the specimen was submitted to Dr. N. L. Bor, who states that, as the glumes are without awns, the specimen is a *Saccharum* and not *Erianthus*, which has the upper glumes awned, the only distinction separating it from *Saccharum*.

The genus *Cintractia* is characterised by the possession of spores agglutinated into a firm spore-mass. Sydow (1924) was unable to detect the spore-masses in the specimen of *C. pulverulenta* which he examined. He doubted if the smut had been correctly placed in that genus and Ciferri (1928) accordingly transferred it to *Ustilago*. Boedijn (1935), too, concluded that the fungus was not a *Cintractia* and again proposed its transfer to *Ustilago*, without knowing that this had already been done by Ciferri. Fragments from the portions of the type specimen, from Kew and the New York Botanic Garden, unmistakably show the presence of firm spore-masses. It is doubtful, therefore, whether Sydow (1924) and Ciferri (1928) had actually seen the type specimen before proposing the change. The specimen examined by Boedijn (1935) is not *Cintractia pulverulenta* Cooke and Massee, but *Ustilago Courtoisi* Ciferri.

That Cooke and Massee had correctly placed the smut in *Cintractia* will be manifest on an examination of their specimen. The sori do not have a false membrane; a columella is present and the spores are agglutinated into a firm spore-mass which breaks up into smaller portions resembling spore-balls after some pressure has been applied. A revised description follows:—

*Cintractia pulverulenta* Cooke and Massee.

Ovariicolous, ovaries swollen into black hard masses, at first compact but later powdery. A tapering columella, around which the spore-mass is formed, present in the centre of the sorus. Spores globose to subglobose, Vandyke Brown (Ridgway); diameter 7.8 to 13.4 $\mu$  with a mean of 10.4 $\mu$ ; thin-walled, with a smooth edge, granular contents and a minutely pitted spore-surface.

On *Saccharum* sp. (originally identified as *Erianthus*) at Nungklao (4,250 ft.), Khasi Hills, Assam; collected by C. B. Clarke (44069), May 28, 1886 (type). So far as I have been able to learn this smut has not been collected since in any locality. Such names as *Cintractia pulverulenta* as used by Rostrup, the *Ustilago pulverulenta* of Boedijn and presumably also the *U. pulverulenta* of Ciferri refer to different smuts.

**Ustilago Courtoisi** Ciferri in Ann. Mycol., 29, 71 (1931).

This smut was collected on *Saccharum* sp. by Prof. F. Courtois in China, and was named by Ciferri, who kindly sent a fragment of

the type for comparison with the Indian collections. Some of the specimens formerly identified as *Cintractia pulverulenta* belong to this species. The description follows:—

Ovaricolous, all the ovaries in an ear attacked; immature ovaries conically acuminate, slightly hypertrophied, 2 to 3 mm. long, blackish, emerging through half-open glumes and opening by bursting of the tegument, exposing dark brown, dusty spore-masses. Spores spherical to subpolyhedral, Prout's Brown (Ridgway); diameter 8.2 to 12.0 $\mu$  with a mean of 9.8 $\mu$ ; episore slightly darker, 1 to 1.5 $\mu$  thick, smooth to slightly punctate but not echinulate.

On *Saccharum* sp. in Ngau-Hoei, Zi-Ka-Wai, Chang-Hai prov. China; collected by F. Courtois, August, 1928 (type). Also on *S. arundinaceum* Retz. in India, Burma, and Java.

1. Typus ex Herb. R. Ciferri.

Diameter	$\mu$	8.2	9	10	11	12	
Frequency	n	11	57	103	27	2	= 200

Mean = 9.8 $\mu$

2. On *S. arundinaceum*, Upper Burma (Abdul Khalil), 1893; from a phanerogamic sheet, ex Herb. Roy. Bot. Gard., Calcutta. (Material very scanty.) Range 8.0 to 12.3 $\mu$  with a mean of 9.9 $\mu$ .

3. On *S. arundinaceum* at Bolampatti, India, 1912. Ex Herb. Crypt. Ind. Orient., labelled "*Cintractia pulverulenta*."

Diameter	$\mu$	7.6	8	9	10	11	11.8
Frequency	n	3	25	55	94	20	3 = 200

Mean = 9.7 $\mu$

4. On *S. arundinaceum* at Tiruvadi, India, January, 1912; from the Mycologist, Coimbatore, labelled "*Cintractia pulverulenta*" [det. Sydow (1914)].

Diameter	$\mu$	7.8	8	9	10	11	12
Frequency	n	1	26	43	114	14	2 = 200

Mean = 9.8 $\mu$

5. On *S. arundinaceum* at Tasikmalaja, Java, February, 1921. From K. B. Boedijn, ex Herb. Bog., labelled "*Ustilago pulverulenta*" [see Boedijn (1935)].

Diameter	$\mu$	7.9	9	10	11.3	
Frequency	n	1	32	56	11	= 100

Mean = 9.8 $\mu$

The smut resembles *C. pulverulenta*, but the spores are smaller and there is a complete absence of spore agglutination. The colour of the spores on *S. arundinaceum* is a slightly lighter brown than is that of the spores of the type.

**Sphacelotheca Sacchari** (Rabenhorst) Ciferri, Flora Ital. Crypt. Ustilaginales, 262 (1938).

Among the plants collected by Dr. Haussknecht in Iran from 1864 to 1868 was a specimen of *Erianthus ravennae* (L.) Beauv. attacked

by a smut, to which Rabenhorst (1870) gave the name *Ustilago Sacchari*. The smut is ovariicolous, but the name was for a long time applied by mistake to the culmicolous smut on sugar-cane. Another ovariicolous smut, on *Saccharum ciliare* Anderss. (= *S. Munja* Roxb.), was collected by D. D. Cunningham in India and sent to Brefeld (1895), who named it *U. Sacchari-ciliaris*. An examination of portions of the type specimens of both these smuts kindly sent by Dr. E. Ulbrich of the Berlin Botanical Museum, indicates that the two smuts are one and the same species.

In a personal communication Dr. G. L. Zundel states that Dr. G. P. Clinton and he had come to the conclusion some years ago that *U. Sacchari-ciliaris* should be placed in the genus *Sphacelotheca*. An examination of its type specimen, of Sydow's Ustilagineen No. 385, and of other collections in Herb. Crypt. Ind. Orient. shows that the sorus, much enlarged, is covered by a peridium which ultimately flakes away exposing the spores and a long, tapering columella. However, as this smut agrees completely with *U. Sacchari*, which also shows a peridium and a columella, its name should be *Sphacelotheca Sacchari*, as already proposed by Ciferri (1938).

*Sphacelotheca Sacchari* (Rabenh.) Ciferri.

Ovariicolous, ovaries elongated. Sori at first enclosed by a false membrane made up of fungus tissue, which later flakes away exposing dusty spore-masses. Columella tapering, nearly or quite as long as the sorus. Spores not agglutinated, free, more or less spherical to oblong, Sudan Brown (Ridgway), smooth to finely punctate; diameter  $7.1$  to  $10.8\mu$  with a mean of  $8.5\mu$ ; epispore thin, edge smooth.

On *Erianthus ravennae* (L.) Beauv. (= *Saccharum ravennae* (L.) Murr.) at Marasch, Iran; collected by Haussknecht (type). Also on *S. Munja* Roxb. (= *S. ciliare* Anderss.) and *S. arundinaceum* Retz. in India and Malaya. Syn. *Ustilago Sacchari-ciliaris* Bref.

6. *Typus*, ex Herb. L. Rabenhorst in Berlin Botanical Museum on *Erianthus ravennae* (L.) Beauv. (= *Saccharum ravennae* (L.) Murr.).

Diameter $\mu$	6.7	7	8	9	10	10.8	
Frequency n	11	28	37	92	30	2	= 200
Mean = $8.5\mu$							

7. On *S. ciliare* Anderss. [*S. Munja* Roxb.] at Calcutta, India (Cunningham); ex Herb. Oscar Brefeld in Berlin Botanical Museum. Type of *U. Sacchari-ciliaris*.

Diameter $\mu$	6.5	7	8	9	10	10.8	
Frequency n	1	43	48	70	36	2	= 200
Mean = $8.5\mu$							

8. On *S. ciliare* [*S. Munja*] at Cawnpore, India (*Butler*), 19-2-1907; ex Herb. Crypt. Ind. Orient., labelled "*Ustilago Sacchari-ciliaris*."

Diameter	$\mu$	7	8	9	10	10.8	
Frequency	n	18	71	78	31	2	= 200
Mean = $8.5\mu$							

9. On *S. ciliare* [*S. Munja*] at Muzaffarpur, India, 21-4-1907; ex Herb. Crypt. Ind. Orient., labelled "*U. Sacchari-ciliaris*."

Diameter	$\mu$	6.8	7	8	9	10	10.7
Frequency	n	8	26	35	104	26	1 = 200
Mean = $8.5\mu$							

10. On *S. arundinaceum* at Pekan, Pahang, Malaya (*H. N. Ridley*) May, 1890; from a phanerogamic sheet, ex Herb. Roy. Bot. Gard., Calcutta. Range 6.8 to 10.8, mean =  $8.5\mu$ .

### **Sphacelotheca Erianthi** (Sydow) Mundkur, comb. nov.

This smut on *Erianthus ravennae* was collected by J. Bornmüller in Turkestan and named by Sydow (1915) *Ustilago Erianthi* Syd. The inflorescence, which normally is 1 to 2 feet long was, according to Sydow, deformed into a club-like structure, barely 4 to 6 inches in length. A fragment of the type specimen kindly obtained for me by Mr. S. F. Ashby from Herr H. Sydow indicates that the smut is a *Sphacelotheca*, as the sorus possesses both a peridium and a columella.

#### *Sphacelotheca Erianthi* (Sydow) Mundkur.

Ovariiculous, ovaries slightly swollen; at first covered by a false membrane made up of fungus tissue, which later flakes away revealing dark, powdery spore-masses and a slightly tapering columella in the centre of the sorus. Spores globose to subglobose, Mahogany Red (Ridgway), finely punctate with granular contents; diameter 4.8 to  $8.6\mu$  with a mean of  $6.5\mu$ ; epispore thin, edge smooth.

On *Erianthus ravennae* in Turkestan, Bokhara, Prov. Baldshuan; collected, 10-8-1913, by J. Bornmüller.

II. Typus, ex Herb. H. Sydow, on *Erianthus ravennae*.

Diameter	$\mu$	4.6	5	6	7	8	8.6
Frequency	n	1	4	57	31	5	2 = 100
Mean = $6.5\mu$							

A specimen collected by Ove Paulsen during Lt. Olufsen's second Pamir Expedition in 1899, between Chiwa and Tshardshui near the river Oxus (Amu Darya), was determined as *Cintractia pulverulenta* Cooke and Mass. by Rostrup (1907). Sydow (1924) states that this smut is identical with his *U. Erianthi*. A portion of the specimen (No. 1876) kindly sent by the Director, Universitets botaniske Museum, Copenhagen, shows that the attacked ovaries



are considerably swollen. The dusty spore-masses are covered by a peridium, and a prominent columella occupies the centre of the sorus. The spores possess a thick episore whose surface and edge are smooth, but the spore contents are granular, giving the spores a pitted appearance. The diameter of the spores is  $7.4$  to  $10.0\mu$  with a mean of  $8.9\mu$ . The absence of spore agglutination excludes it from *Cintractia* and the spore morphology shows that it is not *U. Erianthi*. The smut is a *Sphacelotheca* but its determination is not possible in the absence of the name of the host.

Two specimens of the ovaricolous smuts from Herb. Kew. resemble *S. Erianthi* in many respects. The material consists of three or four sori each, in all of which a peridium and a columella are distinguishable. The spores are globose to subglobose; the episore is thin and the edge smooth, but the spore surface is almost smooth to slightly rough in these specimens, whereas in *S. Erianthi* it is finely punctate. The spores are also larger. Pending examination of more material these smuts are referred to *Sphacelotheca Erianthi*.

12. On *Saccharum* sp. collected at Lahore, India, May 5, 1865 (*Dr. Stewart*) ex Herb. M. C. Cooke, ex Herb. Kew., labelled "*Ustilago segetum*." Range  $5.9$  to  $9.3\mu$  with a mean of  $7.2\mu$ .

13. On *Saccharum* sp. near Soane river; collector's name and date not stated. Ex Herb. Berkeley, No. 4744a, ex Herb. Kew., labelled "*Ustilago carbo* Tul. var." Range  $5.6$  to  $9.3\mu$  with a mean of  $7.1\mu$ .

### ***Ustilago microthelis* Sydow in Ann. Mycol., 22, 280 (1924).**

This smut was collected by E. Ule on *Erianthus asper* Nees at Itajahy, Brazil, and determined as *Ustilago Sacchari* Rabenhorst by Hennings (1896). Because of its densely verrucose spores and larger spore size, Sydow (1924) rightly thought that determination incorrect and founded a new species, *Ustilago microthelis*, to accommodate it. A fragment of the type specimen was kindly obtained for me by Mr. S. F. Ashby from Herr H. Sydow. The revised description is as follows:—

Ovaricolous, entirely destroying the ovaries; spore-masses exposed, powdery, black. Spores globose to subglobose, some elliptical, Chestnut (Ridgway), densely but minutely verrucose; diameter  $7.9$  to  $12.6\mu$  with a mean of  $10.5\mu$ ; episore thin with spiny edge.

On *Erianthus asper* Nees [= *Saccharum asperum* (Nees) Steud.] at Itajahy, Brazil; collected by E. Ule in November, 1885 (Type).

14. On *Erianthus asper*, ex Herb. Sydow, Type.

Diameter	$\mu$	7.9	9	10	11	12	12.6	
Frequency	n	5	12	35	33	11	4	= 100
Mean = $10.5\mu$								

#### A SMUT ON *ERIANTHUS CAPENSIS* NEES.

In the folder of *Ustilago Sacchari* Rabenhorst at Herb. Kew. is a smut on *Erianthus capensis* collected by W. Saxton at Transkei, Cape Colony, South Africa. The smut was named *Ustilago gigaspora* by Massee, which is only a herbarium name, as it has not so far been effectively published. The material sent to me consists of a single considerably swollen ovary. The spore-masses are enclosed in a firm, brownish membrane but there is no columella in the sorus. The spores are powdery, elliptical to polyhedral, with a medium thick epispore and a smooth edge and surface. The spores are Prout's Brown (Ridgway) in colour, the epispore being slightly darker. Measurements of 50 spores gave a range of  $13.0$  to  $21.5\mu$  and a mean of  $17.3\mu$ . I am inclined to consider this as an undescribed species of *Tilletia*, none of which has so far been reported on the *Saccharum* group. Without an examination of more material, however, I hesitate to say more.

#### A SMUT ON *SACCHARUM MUNJA* ROXB.

In 1935 L. S. Subramaniam collected at Cuttack, India, a smut on *Saccharum Munja* which he identified as *Cintractia pulverulenta*, but he was presumably not sure of the identification, for on the label he has also written "? *Sorosporium*." The smut is undoubtedly a new *Sorosporium*, for which I propose the name *Sorosporium indicum*.

#### *Sorosporium indicum* Mundkur spec. nov.

Ovaria incolens; plurima inflorescentiae ovaria aggrediens. Adsunt membranae vestigia. Sporarum massa centalem circa columellam, quae est fastigata glumisque breviter longior. Sporarum glomeruli oblongi vel irregulariter ovati, nigri,  $130.2$ – $50.4\mu$  longi et  $79.8$ – $33.6\mu$  lati, medii inter minimos maximosque  $89.5$ – $58.8\mu$ . Sporae ovales vel globosae, Antique Brown (Ridgway), leves, diametro  $6.5$  ad  $9.6\mu$ , mediae inter maximas minimasque  $7.9\mu$ , epispodium tenue.

Habitat *Saccharum Munja* Roxburgh, Cuttack, Indiae orient.; legit L. S. Subramaniam, die 22 Novembris, 1935. Specimen exemplarum in Herb. Crypt. Ind. Orient. in Herb. Imp. Mycol. Inst. et Herb. Kew.

Ovariicolous; most of the ovaries in the inflorescence attacked. Vestiges of a membrane present. Spore-masses round a columella which is tapering and slightly longer than the glumes. Spore-balls oblong or irregularly egg-shaped, black,  $130.2$  to  $50.4\mu$  in length and  $79.8$  to  $33.6\mu$  in breadth with a mean of  $89.5 \times 58.8\mu$ . Spores oval to globose, Antique Brown (Ridgway), smooth; diameter  $6.5$  to  $9.6\mu$  with a mean of  $7.9\mu$ ; epispore thin.

On *Saccharum Munja* Roxb. at Cuttack, India; collected by L. S. Subramaniam, November 22, 1935. Type specimen deposited in Herb. Crypt. Ind. Orient. Herb. Mycol. Instit., Kew, and Herb. Kew.

15. Type. On <i>Saccharum Munja</i> .						
Diameter	$\mu$	6.5	7	8	9	9.6
Frequency	n	4	82	85	26	3 = 200
Mean = 7.9 $\mu$						

#### DISCUSSION.

Considerable confusion exists in the identification of the ovariicolous smuts affecting the genera *Saccharum* and *Erianthus*, primarily because the original descriptions were not precise and secondly because the determinations of the later collections were made without comparison with type or authentic specimens. This study shows how necessary is such a comparison, especially when changes in the generic position of the species are proposed. The generic name *Cintractia* has, in recent years, been restricted to smuts on the family Cyperaceae, but Cooke and Massee's fungus, even though it is on a graminaceous host, is so clearly a *Cintractia* that their judgment in placing it in that genus cannot be doubted.

The disagreement among agrostologists regarding the classification of the genera *Saccharum* and *Erianthus* complicates the taxonomic position of the smuts attacking their species, but the distinction between these two genera, if any, must be biologically very slight. At any rate, the same species of smuts seem to attack species of either genus.

The ovariicolous smuts affecting these genera are not as important economically as the culmicolous smuts, which are responsible for much damage to the sugar-cane crop.

#### SUMMARY.

Eighteen specimens, six of them portions of type collections, of the ovariicolous smuts attacking species of the genera *Saccharum* and *Erianthus*, have been critically studied. *Ustilago pulverulenta* has been found to be a good *Cintractia* as was originally determined by Cooke and Massee and the name proposed by them, *Cintractia pulverulenta*, is retained after an examination of the type specimen. The host of this smut, formerly stated to be an *Erianthus*, has been re-determined as a species of *Saccharum* by Dr. N. L. Bor. The smuts determined by Sydow as *C. pulverulenta* and by Boedijn as *U. pulverulenta* are *Ustilago Courtoisi* Ciferri. *U. Erianthi* Sydow is transferred to the genus *Sphacelotheca*. A smut on *Saccharum Munja* is proposed as a new species, *Sorosporium indicum*. A smut on *Erianthus capensis* is evidently an undescribed species of *Tilletia* but the material I have is so scanty that final judgment on it is postponed until more material becomes available.

#### ACKNOWLEDGMENTS.

I wish to thank Sir Arthur Hill, Director, and Miss E. M. Wakefield, Cryptogamic Assistant, Royal Botanic Gardens, Kew; Mr. S. F. Ashby, formerly Director, Imperial Mycological Institute, Kew; Dr. E. Ulbrich, Kustos, Berlin Botanical Museum; Dr. F. J. Seaver, Curator, New York Botanic Garden, and Herr H. Sydow

and Dr. R. Ciferri for their kindness in sending me or securing for me portions of the type specimens discussed in this paper. I am grateful to the staff of the Imperial Mycological Institute for critically going through the manuscript of this paper and for suggestions. The Rev. Father A. Rapinat, S.J., very kindly supplied the Latin diagnosis of the new species.

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[Since this paper was prepared for publication an inflorescence of sugar-cane, *Saccharum officinarum* L., affected by *Sphacelotheca Sacchari* (Rabenhorst) Ciferri, has been collected at Muzaffarpur, Bihar. B.B.M.]

## XI.—CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA : XLV.\*

NEW PLANTS FROM THE ANDES OF VENEZUELA AND COLOMBIA.  
N. Y. SANDWITH.

The following descriptions are of striking new plants discovered by Mr. John Hanbury-Tracy on a recent collecting expedition in 1938-1939 to the Andes of Venezuela and Colombia. Owing to war conditions it has, as yet, been possible to determine only about half of the collection. Mr. Hanbury-Tracy and his wife camped for some months in the latter half of 1938 and early in 1939 on the Venezuelan Andes of Merida, and were able to visit a large number of paramos at least one of which, the Paramo de Molina at the eastern end of the Sierra, was botanically unexplored. The result is a valuable accession to the Kew Herbarium, which was weak in sets of the older collectors from Europe such as Moritz and Funck and Schlim, who had previously visited this region, and had only a scanty representation of the extensive modern gatherings of Drs. Pittier and Jahn who were resident in Caracas. Among the additions which Mr. Hanbury-Tracy has made to the Kew collections are the magnificent Melastomaceous species *Centronia pulchra* Cogn., *Begonia meridensis* A.DC., *Niphogeton ciliatum* (Wedd.) Rose ex Pittier, *Erigeron blepharophyllus* Blake, *Gnaphalium paramorum* Blake and *Senecio Funckii* Wedd. Outstanding is the abundant material of the remarkable genus *Espeletia*, the species of which—known locally as “Frailejones” because of the resemblance of their woolly leaves to priests’ vestments—are the Andine counterpart of the African tree-Senecios. Mr. Hanbury-Tracy collected eleven species, viz. *E. neriifolia* (H.B.K.) Wedd., *E. marcescens* Blake, *E. Lindenii* Wedd., *E. banksiifolia* Wedd., *E. atropurpurea* A. C. Smith, *E. Weddellii* Wedd., *E. Moritziana* Wedd., *E. “spicata* Wedd.” of A. C. Smith’s revision, *E. elongata* A. C. Smith, the common *E. Schultzii* Wedd. and *E. pannosa* Standley. Of these *E. elongata* was a new species which Dr. Smith has described in Amer. Journ. Bot. xxvii. 546 (1940), *E. marcescens* and *E. banksiifolia* had been collected only once before, while the latter species, *E. atropurpurea* and *E. “spicata”* (it seems doubtful if Dr. Smith has interpreted Weddell’s species correctly), were additions to the Kew Herbarium. The collector’s field-notes are of importance to students of the genus since they show conclusively that both *E. marcescens* and *E. banksiifolia* are white-flowered species of tree habit, the former being 15 ft., the latter 20-30 ft. high.

In March 1939, Mr. and Mrs. Hanbury-Tracy moved into Colombia and collected on the low-lying Goajira Peninsula, for more than three months on the Sierra Nevada de Santa Marta, and on the Cordillera Central in the neighbourhood of Tolima, where, their activities came to an end with the outbreak of the war. In Colombia

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\* Continued from K.B. 1940, 304.

they found two more species of *Espeletia*, *E. glossophylla* Mattf. (the endemic of the Sierra Nevada de Santa Marta) and *E. Hartwegiana* Cuatrecasas.

The following is a sketch of the itinerary :

August 11th–September 1st, 1938. From Merida, **Venezuela** : to Paramo del Tambor, including camp at Bocono and La Playa, *en route*.

September 6th–October 1st, 1938. From Merida : to Paramos de Conejos, de Campanerio and de Albarregas.

October 12th–November 14th, 1938. From Merida : to Paramos de Acquiás, de Mucutuy, de las Lajas, de San José, del Molino.

November 23rd–December 29th, 1938. From Timotes : to Paramos de Niquitao, de Piñango and de Mucuchies.

January 10th–February 3rd, 1939. From Merida to Paramo de Molina.

March 12th–14th, 1939. From Merida to Maracaibo.

March 17th–27th, 1939. In Goajira Peninsula, **Colombia**.

April 4th–July 10th, 1939. On Sierra Nevada de Santa Marta.

August, 1939. On Tolima range, Cordillera Central.

#### GERANIACEAE.

**Geranium Tracyi** sp. nov. ; foliorum ambitu *G. multicipiti* Turcz. affinis a cujus formis adhuc ab auctore visis habitu indumentoque distinguitur.

*Herba* perennis, caulibus decumbentibus vel prostratis gracilibus ad 35 cm. longis, pilis brevibus simplicibus eglandulosis patentibus vel subdeflexis dense molliter pubescentibus, dimidio inferiore ob foliorum lapsum longe nudis, basi super rhizomate vel caudice stipulis persistentibus brunneo-rubris apice flexuoso-subulatis ad 1 cm. longis praeditis, dimidio superiore foliosis floriferisque, scilicet folia opposita pedunculum biflorum (unicus tantum ramulus lateralis dichasii cujusque evolvitur) subtendentia gerentibus ; internodia inferiora 10–15 cm. longa. *Stipulae* brunneae, lanceolatae, apice subulatae, ciliatae, ad 5 mm. longae. *Folia* basalia non visa ; caulina ambitu semicircularia, 2–3 cm. diametro, ad medium vel paulo ultra medium 5-partita, lobis oblongis vel obovato-oblongis 4–8 mm. latis omnibus (lateralibus extimis profundius) inaequaliter 2–3-lobulatis, lobulis obtusis calloso-mucronatis, coriacea marginibus revolutis, supra pilis rigidiusculis copiose regulariter sed haud dense pilosa nervis canaliculato-immersis, subtus pallidiora pagina fere vel omnino glabra punctata nervis valde prominentibus conspicue pilosis ; petiolus indumento caulis molliter indutus, 2–7.5 cm. longus, foliorum inflorescentiae summorum brevior. *Inflorescentiae* pedunculi indumento caulis eglanduloso induti, 2.5–7 cm. longi, apice bracteati ; bracteae lineari-lanceolatae, molliter pubescentes, 5 mm. longae ; pedicelli eodem indumento densius induti, 1–4 cm. longi. *Sepala* oblonga, obtusa, apice brevissime calloso-mucronata, 5–7.5 mm. longa, 2–2.75 mm. lata, pilis patulis vel subadpressis simplicibus eglandulosis satis dense molliter pubescentia. *Petala*

lilacina vel alba, sepalis plus minusve duplo longiora, obovato-spathulata, 1.15 cm. longa, ad 6.5 mm. lata. *Stamina* inaequalia, vix ad 6 mm. longa; filamenta dimidio inferiore ciliata vel nonnulla glabra. *Ovarium* pilis simplicibus patulo-ascendentibus dense pubescens. *Carpidia* similiter induta, 3.5 mm. longa, rostris patule pubescentibus circiter ad 1.5 cm. longis.

VENEZUELA. Merida: Paramo del Tambor, in open paramo among grasses, herbs and undershrubs, 2820 m., August 23rd, 1938, *J. Hanbury-Tracy* 50. "Straggling, often prostrate on ground. Flowers mauve-pink, pink or white." Vernacular name, "Aroma."

This plant, characterised by its habit and leaves, and by the spreading eglandular indumentum of the stems and inflorescence, seems to fit into none of the species described from this region by Turczaninov, or more recently by R. Knuth, Standley, Blake and Pittier. It must be confessed, however, that thorough field-investigation may prove that *G. multiceps* Turcz. is a very variable species embracing many forms differing in their habit, the shape of their leaves, and the amount and direction of the indumentum of various parts. Meanwhile, the plant described above presents a combination of characters which is matched in none of the forms which have been examined. At the moment no collection has been seen which exactly matches the type number (*Funck and Schlim* 861, from Venezuela) of *G. multiceps*. The specimen of this number in the British Museum Herbarium agrees well with Turczaninov's description except that the leaves are hardly "utrinque pube adpressa vestitis": rather, they are glabrescent with ciliate margins, and with the main veins of the lower surface sometimes, but apparently not always, obscurely pubescent. A notable feature of this specimen is the extremely short, closely downward-adpressed pubescence of the stems, petioles, peduncles, pedicels and sepals, which is unmatched in other material, including *Moritz* 1247 from Venezuela, which has been referred to *G. multiceps*. Thus also, the distinctive plant which is common around Bogotá in Colombia and has been identified with *G. multiceps* by all authors since Triana is certainly not the "typical" form of that species, whatever other relationship it may bear to it.

Apart from *G. multiceps*, the other possible allies described from the Merida region, *G. subnudicaule* Turcz. and *G. velutinum* Turcz., differ from *G. Tracyi* in the shape and tothing of the leaf-lobes, while the former also has a glandular-pilose inflorescence, and the latter—according to the description—has subsessile or shortly pedunculate pedicels. This conspicuously glandular-pilose indumentum of the pedicels and sepals is an important character of the type collection (*Funck and Schlim* 1127 in Herb. Mus. Brit.) of *G. subnudicaule* which was not mentioned by Turczaninov: account will have to be taken of it in relating the species to certain others which have been described in recent years. Similarly, the type collection (*Linden* 1394 in Herb. Kew.) of *G. Lindenianum* Turcz.

has a glandular-pilose inflorescence. That of *G. velutinum* (Funch and Schlim 1251) has, unfortunately, not been seen and is presumably not represented in Britain.

#### LEGUMINOSAE.

**Lupinus verbasciformis** sp. nov.; *L. venezuelensi* C. P. Smith atque *L. alopecuroidi* Desr. affinis, ab illo petiolis longe villosio-lanatis foliolis 10-11 latoribus oblanceolatis planis racemo longissimo pedunculo deflexo-villoso, ab hoc statura magnitudine foliorum racemo pro rata tenui statim distinguitur.

*Herba* perennis, circiter 5 dm. alta, basi valde foliifera ibique caules juniores in exemplo unico viso brevissimos emittens; caulis principalis fistulosus, 8-9 mm. diametro, pilis albis longis deflexis laxo villosio-lanatus. *Stipulae* inferne dilatato-adnatae, parte libera lineari-filiformi circiter 1.5 cm. longa. *Folia* 5-10 cm. longa incluso petiolo ad 7 cm. longo pilis deflexis longe laxo villosio-lanato; foliola 10-11, anguste oblanceolata, apice obtusa vel acuta et abrupte brevissime mucronato-cuspidata, basin versus sensim attenuata, maxima vix 3 cm. longa, ad 7 mm. lata, plana, supra satis laxo adpresse pilosa, subtus copiosius villosa et laxo lanata. *Pedunculus* 7.5 cm. longus, indumento caulis vestitus. *Racemus* unicus visus fere 33 cm. longus, 3 cm. tantum diametro, apice comoso-bracteatus, verticillis circiter 15, quorum imis internodiis 2-3 cm. longis sejunctis, ceteris approximatis internodiis brevibus sub bracteis calycibusque undique dense albo-lanatis vix cernendis; bractee filiformes, persistentes, plerumque flexuosae vel recurvae, 1-2.2 cm. longae; pedicelli albo-villosi, 4-5 mm. longi. *Flores* ascendentes. *Calyx* extra longe albo-lanato-villosus, 1.2 cm. longus; labium superius profunde ultra medium bifidum, lobis lanceolatis 8-8.5 cm. longis basi fere 2.5 mm. latis; inferius concavum, lanceolatum, apice tridentatum, 9 mm. longum, basi fere 3 mm. latum. *Petala* intense caerulea, paginis glabra; vexillum 1.25 cm. longum, 1 cm. latum, dorso conspicue carinatum carina apice basique dilatato-alata praeterea apice apiculatum; alae 1.5 cm. longae, 7 mm. latae; carina 1.5 cm. longa, marginibus superioribus ciliatis. *Ovarium* longe lanato-villosum. *Legumen* non visum.

VENEZUELA. Merida: Paramo de Campanerio, c. 4000 m., September 14th, 1938, J. Hanbury-Tracy 91. "In open paramo, among herbs, grasses and undershrubs, in close association with *Frailejones* (*Espeletia* spp.). Rare. Height about 18 inches. Flowers deep blue." Vernacular name, "Chocho del paramo."

Only a single lupin, *L. ramosissimus* Benth., had been recorded from Venezuela up to the year 1927 when R. Knuth compiled his *Initia Florae Venezuelensis*. In October, 1938, however, Dr. Charles Piper Smith began his paper no. six of the series "Species Lupinorum", devoting it to the genus *Lupinus* in Venezuela. On the completion of this paper in February, 1939, eleven species of lupin had been described and recorded from the Republic and a key was given by which to distinguish them. Mr. Hanbury-Tracy



collected two lupins on the Andes of Merida, *L. meridanus* Moritz ex C. P. Smith and the fine new species with a long, woolly, mullein-like raceme which is described above. This plant is clearly related to Dr. C. P. Smith's *L. venezuelensis* which is based on a collection made by Dr. Pittier on the Paramo de Timotes, near Merida; but it differs from it in a number of obvious characters, as can be seen from the diagnosis. It also bears an interesting resemblance to the giant *L. alopecuroides* of the Andes of Colombia, Ecuador and Peru. *L. Lindenianus* C. P. Smith, from the evidence both of the description and of one of the cited collections (*Funck and Schlim* 1611, see specimen in Herb. Mus. Brit.), is of a wholly different affinity, having, *inter alia*, a much longer main stem below the inflorescence and a sericeous adpressed indumentum on the slender petioles and on the leaflets which are glabrous above, as well as lacking the remarkable facies of the woolly raceme of Mr. Hanbury-Tracy's lupin.

#### MELASTOMACEAE.

**Monochaetum uberrimum** sp. nov.; in sect. *Grischowia* (Karst.) Triana grege *Lindenianae* Gleason ponenda, habitu robusto, ramis ramulisque inflorescentiae insigniter tetragonis costis angulorum elevatis, inflorescentiis uberrimis densissime multifloris valde distincta.

*Suffrutex* humilis; rami robusti, acute tetragoni subalati costis conspicue elevatis sed his decorticantibus demum inferne teretes, 4-6 mm. diametro, internodiis siccitate brunneis glabris vel parce plerumque adpresse rarius patule strigoso-pilosis, nodis longe inaequaliter setoso-pilosis. *Folia* ovato-elliptica, apice acute acuminata vel acuta, basi cuneata, maxima ad 4 cm. longa ad 1.7 cm. lata, firme chartacea, supra inter nervos et juxta margines lineis longitudinalibus leviter strigillosa, subtus secus nervos conspicue strigosa pagina ubique satis parce strigillosa, 5-plinervia addito etiam pari obscuro marginali, nervis supra impresso-canaliculatis subtus prominentibus; petiolus gracilis, conspicue strigosus, 4-6 mm. longus. *Inflorescentiae* uberrimae, densissime multiflorae, repetite ramuloso-cymosae, ramulis rigidis tetragonis intricatissimis atque siccitate superpositis, apice 5-12 cm. latae, glabrescentes vel glabrae; pedicelli graciliores, 5-8 mm. longi vel illi florum cymarum ultimarum lateralium breviores, parce strigosi. *Hypanthium* ovoideo-oblongum, 6 mm. longum, 3.5 mm. diametro, super ovario constrictum et 2 mm. ultra elevatum, parce strigosum, demum glabrum sed apice ipso parce setosum, rubro-tinctum. *Sepala* ovata, acuminata, 6-6.5 mm. longa, 2.75-3.5 mm. lata, glabra, ciliata, apice haud setosa, rubro-tincta. *Petala* carminea, obovata, 1.1-1.3 cm. longa, 8 mm. lata. *Stamina* majora filamentis 7.5-8 mm. longis, antheris 1-1.05 cm. longis, appendicibus 5-5.7 mm. longis triente inferiore filiformi-filamentiformi trientibus duobus superioribus concavo-cymbiformibus rugulosis margine sinuatis sursum subintegris longe attenuatis vel irregulariter 3-lobis lobo intermedio terminali longo lobis lateralibus plerumque brevibus vel brevissimis

rotundato-obtusis. *Stamina minora* filamentis 8.5–9 mm. longis, antheris 5.2–6 mm. longis, appendicibus his aequilongis vel fere aequilongis oblongo-lanceolatis apice longe (ad 1.5 mm.) attenuato-acuminatis basi in unguem complanatum attenuatis. *Ovarium* apice setosum; stylus 1.5–1.6 cm. longus.

COLOMBIA. Sierra Nevada de Santa Marta: Surivaquito, on open paramo, 3000 m., April 22nd, 1939, *J. Hanbury-Tracy* 316. "Under-shrub 2 ft. high. Flowers carmine."

The staminal characters of this interesting plant seem to disturb Dr. Gleason's key for distinguishing his two groups, *Lindenianae* and *Humboldtianae*, of the section *Grischowia* (see Amer. Journ. Bot. xvi. p. 509), since the filaments of the two series are subequal while the appendages of the smaller series are usually quite as long as the anthers; but there seems to be little doubt that its affinity is with the *Lindenianae* rather than with the other group which, up to the time of writing, is known only from Venezuela. The nearest allies are evidently *M. meridense* (Kl.) Naud. and *M. laxifolium* Gleason, the former of which occurs both in Colombia and Venezuela while the latter, on present evidence, is an endemic of the Sierra Nevada de Santa Marta. *M. uberrimum* is immediately distinguished from both species by the robust habit with thick strongly tetragonous branches, and by the very remarkable inflorescence; it approaches *M. meridense* in the dimorphic anthers and *M. laxifolium* in the long style, but presents an entirely new combination of floral characters.

#### BEGONIACEAE.

**Begonia** (§ *Casparya*) **formosissima** sp. nov.; *B. montanae* (DC.) Warb. affinis, floribus maximis speciosissimis, praeterea magnitudine stipularum bractearum antherarum, connectivo harum in laminam conspicuam multo longius producto primo visu distinguitur.

*Herba* fruticosa, teste lectore repens; caules elongati foliosi, ex axillis foliorum ramulos breves pilosos folia ipsa paulo superantes emittentes, glabri vel sub nodis obscure lineatim pilosi, sulcati, 2–3 mm. diametro; internodia 2.5–6.5 cm. longa. *Folia* eis *B. montanae* similia, ovata, apice acute acuminata, basi valde obliqua latere altero ambitu attenuato sed basi ipsa revera rotundato-auriculato altero majore conspicue late rotundato et demum super petiolo breviter auriculato, 3–5.5 cm. longa, 1.6–2.8 cm. lata, tenuiter chartacea, opaca, dupliciter serrata dentibus setis terminatis, supra ut in *B. montana* pagina inter nervos setis sparse adpresse pilosa, subtus pallidiora secus nervos pilosa ceterum glabra, nervis utroque costae latere 6–7 supra planis vel impressis subtus conspicuis; petiolus vulgo 1–1.5 cm. longus, superne aliquantum pilosus. *Stipulae* oblongae, mucronatae, fimbriato-dentatae, 1–1.4 cm. longae, 4–6 mm. latae, secus ramulos aliquantum minores. *Pedunculi* folia superantes, 5.5–11.5 cm. longi, graciles, glabri, apice 2–3-flori, scilicet dichasii florem terminalem cymulamque lateralem unicam 1–2-floram gerentes; bractee obovato-oblongae, magnitudine

stipularum, illae cymulae lateralis 1-2-florae minores multo angustiores; pedicellus floris terminalis 3.5-5 cm. longus, florum lateralium brevior. Flores masculi tantum visi, formosissimi, intense scarlatini, 8-9.5 cm. diametro; alabastra sub anthesi anguste elliptico-oblonga, 3.2-3.7 cm. longa. Tepala 4, glabra; exteriora oblonga, 4.5-5 cm. longa, 1.2-1.8 cm. lata; interiora (petala) spathulato-oblonga, basin versus conspicue contracta angustata, exteriora superantia, ad 5.3 cm. longa, 2-2.6 cm. lata. Stamina libera, circiter 40; filamenta brevia, 2-3.2 mm. longa; antherae filamentis multo longiores, anguste lineari-oblongae, 7.5-9.5 mm. longae, connectivo in laminam foliaceam anguste oblongam vel spathulato-oblongam obtusam 3-4 mm. longam ad 1.2 mm. latam producto.

VENEZUELA. Merida: Paramo de las Lajas, Mucutuy, 2550 m., October 25th, 1938, J. Hanbury-Tracy 142. "Creeper, in thick woods 200 ft. below open paramo with high humidity. Flowers vivid scarlet."

In spite of the absence of female flowers and fruits I have little hesitation in placing this magnificent plant in the section *Casparya*, subsection *Sasseea*, next to *B. montana* (DC.) Warb. which is also an endemic of the Sierra Nevada de Merida. The stems and foliage of the two species are remarkably alike, as are the general characters of the male flowers which, however, differ astonishingly in the size of the tepals and stamens and in the relative length and appearance of the produced portion of the anther-connective.

#### COMPOSITAE.

**Culcitium rex** sp. nov.; *C. Panizae* Duse (*C. paramensi* Cuatr.) affinis, ramis multo crassioribus ubique persistenter lanatis, foliis multo majoribus reflexis vel patentibus basi haud cordatis praeterea distincte petiolatis petiolo circa caulem late vaginante, bracteis involucri exterioribus multo angustioribus, corollae structura statim distinguitur.

*Frutex* usque ad 2 m. altus; rami robusti, teretes, 1-1.5 cm. crassi, ubique etiam inferne in parte defoliata dense adpresse albo-lanati. *Folia* per 15-22 cm. dense imbricata, inferiora reflexa, superiora patentia, crassissime coriacea, integra marginibus valde revolutis, oblonga vel oblongo-lanceolata vel lanceolata, apice cucullato-obtusa, basi in petiolum brevem rotundato-cuneata, 2.3-4 cm. longa, 0.6-1.7 cm. lata, supra glabra nisi basi lana deterrenti insigniter vestita valde nitentia atque vernicosa siccitate saturate brunnea costa vix vel anguste ac obscure canaliculato-impressa, subtus lana alba laxa deterrenti vestita praeterea tomento sordide albo-brunneo dense arcte induta costa crassa prominente; petiolus circiter ad 3 mm. longus atque latus, lanatus atque tomentosus vel demum supra glaber, basi circa caulem latissime vaginans. *Capitula* compluria (ut videtur 6-8) apice ramorum in corymbum densum 3.5-7 cm. diametro aggregata, pedunculata; pedunculi ad 1.5 cm. longi, densissime

villosa-lanati, fere nudi vel bracteis compluribus lineari-filiformibus 1-1.5 cm. longis praediti. *Capitulum* discoideum, homogamum, subglobosum, involucre campanulato, 1.8-2.2 cm. diametro. *Involucri* bracteae exteriores, scilicet bracteae calyculi irregularis inaequilongae pluriseries, eis pedunculi similes; summae interiores circiter 21, biseries, fere aequilongae, exteriores paulo longiores, hae lineari-lanceolatae apicem versus conspicue attenuatae 1 cm. longae 2 mm. latae passim rigidae dorso anguste carinatae concavo-cymbiformes, interiores anguste elliptico-oblongae vix 1 cm. longae 2.75 mm. latae dorso crasse late brunneo-carinatae ceterum pallidae scariosae planiusculae, omnes obtusae basi lanatae superne ciliato-fimbriatae apice lanatae ceterum demum plus minusve glabrae. *Receptaculum* apice planiusculum, leviter tantum convexum, glabrum, leviter sed conspicue alveolatum conjunctionibus jugorum in denticulos acutos surgentibus. *Flores* ochroleuci, involucre superantes; corollae tubus 4 mm. longus; limbus tubuloso-infundibuliformis, 3.5-5 mm. longus, profunde lobatus, lobis triangulari-lanceolatis obtusis 1.5 mm. longis enerviis apice callosoincrassatis. *Stamina* filamentis 3.5 mm. longis; antherae 3-3.2 mm. longae, corollae lobos paulo vel conspicue superantes. *Stylus* 1.05 cm. longus, ramis recurvis apice penicillatis, corollam longe superans. *Achaenia* lineari-oblonga, glabra, costata, immatura 3 mm. longa. *Pappus* albus, setis denticulatis corollam aequantibus.

VENEZUELA. Merida: Paramo de Conejos, 4000 m., September 25th, 1938, J. Hanbury-Tracy 151. "Shrub 5-7 ft. high, in open paramo among herbs, grasses and undershrubs, on rather dry soil. Flowers pale yellow."

The affinity of this splendid plant is apparently with *C. paramense* Cuatr. and *C. Panizzae* Duse, which present the same facies of leaves and capitula on a much smaller scale, but differ in the more obvious gradation of the broader outer involucre bracts as well as in other characters of the leaves and flowers. It is believed that these two species, both based on material from the summit of Mt. Tolima in Colombia, are conspecific in spite of small discrepancies between the descriptions; and it seems evident that *Senecio crymophilus* Wedd., Chloris Andina, i. 95, also from the peak of Tolima, is a very close ally (this affinity was suggested by Cuatrecasas) and if actually conspecific will provide the earliest epithet for the plant. The types of all these species should be compared as soon as possible. The involucre of Mr. Hanbury-Tracy's plant shows how poor is the distinction between *Senecio* and *Culcitium*: the fact is that the outer rows of bracts are merely members of the "calyculus" placed at slightly different levels up the back of the receptacle, and in this instance they all differ markedly in breadth from those of the innermost series. *Culcitium* is by now a somewhat heterogeneous collection of discoid Andine species of *Senecio*, and this new Venezuelan shrub should be placed in it for the present on account of the apparent relationship with *C. Panizzae* (*C. paramense*) and *C. ovatum* (*C. reflexum*).

**Senecio longepenicillatus** nom. nov.—*S. nevadensis* Wedd., Chloris Andina, i. 97 (1856); R. Knuth, Initia Fl. Venez., in Fedde Rep. Sp. Nov. Beih. Band xliii. 730 (1928); Greenman in Ann. Missouri Bot. Gard. xxv. 810 (1938); *non S. nevadensis* Bss. et Reut. Pug. Pl. Nov. 60 (1852).

VENEZUELA. Merida: Paramo de la Culata, Moritz 1383; *ibid.*, Jahn 131a (fide Greenman); Paramo de Campanerio, September 19th, 1938, J. Hanbury-Tracy 98; Paramo de Piñango, Timotes, December 9th, 1938, J. Hanbury-Tracy 263.

A new name being required for this species, the above manuscript epithet of Schultz-Bipontinus, previously published only as a synonym of *S. nevadensis* Wedd. by Weddell, the Index Kewensis and Knuth, is now adopted and given legitimate status.

**Senecio venezuelensis** sp. nov.; *S. pachypo* Greenm. ex eadem regione descripto verisimiliter affinis, ramis glabris sed laccatis, foliis multo majoribus haud arcte crenatis sed argute serratis basi attenuatis, bracteis involucri longioribus, ligulis numerosioribus differt.

*Frutex* fere omnino glaber, usque ad 1.5 m. altus, satis intricate ramosus, ramis inferioribus ligneis nonnunquam elevatim suberoso-rugosis ad 1 cm. diametro; rami superiores juniores aggregati, cicatricibus crassis elevatis scilicet petiolorum delapsorum reliquiis notati; ramuli ultimi hornotini glabri sed lacca tenui membranacea alba facile deterrenti praecipue prope petiolorum bases notabili oblecti; internodia 0.5–2.5 cm. longa. *Folia* superne aggregata, elliptica, obovato-oblonga, obovata vel oblanceolata, apice acuta vel rotundata, basi in petiolum cuneate attenuata, 2–5.7 cm. longa, 1–2.7 cm. lata, patula, rigide coriacea, siccitate brunnea, oculo nudo glaberrima sed revera plerumque papillis albis linearibus irregulariter conspersa, trientibus duobus superioribus argute satis remote serrata dentibus utroque margine 7–8 patulis vel plus minusve porrectis 0.5–2.5 mm. latis papillis albis secus margines sparsis sed in sinibus confertis, supra lucida nervis sulcato-immersis pagina intricatissime rugulosa, subtus costa plana vel prominente nervis utroque latere 4–5 ascendentibus impressis pagina sub lente glandulis aurantiacis creberrime punctata; petiolus vulgo 1 cm. (0.5–1.5 cm.) longus, basi dilatatus atque nodoso-incrassatus. *Inflorescentia* corymbum terminalem simplicem vel basi cymosum satis densum sed paucicapitatum 4–7 cm. latum efformans, siccitate brunnea, oculo nudo glabra sed papillis raris conspersa atque lacca deterrenti hic illic notata; rami imi ad 4.5 cm. longi; bractee conspicuae, lineari-oblongae vel spatulato-oblongae, concavo-cymbiformes, 0.8–1.7 cm. longae, 1.5–3.5 mm. latae, margine papilloso-ciliatae, apice penicillato-lanatae, basi incrassatae; pedicelli 1–4 cm. longi. *Capitula* conspicue radiata, circiter 1.5 cm. alta, ligulis inclusis 2.5–3 cm. lata. *Involucrum* bracteis lineari-oblongis sese ipso aliquantum brevioribus calyculatum; bractee involucri ipsius 12–13, lineari-oblongae, obtusae, 0.9–1 cm. longae, 1.5 (exterioribus)–3.5 mm. latae, interiores marginibus late scariosis, apice penicillato-

lanatae, praeterea interiores dimidio superiore fimbriato-ciliatae, ceterum glabrae. *Receptaculum* apice valde convexum, profunde alveolatum atque conspicue denticulatum. *Flores radii* 8-13; tubus ad 5 mm. longus; ligula flava, siccitate vero supra laete pallide flava subtus brunnea, ad 1.2 cm. longa, ad 3.75 mm. lata, apice 2-3-lobulata. *Flores disci* 25-30; tubus circiter 2.5 mm. longus; lamina infundibuliformis, 3.5-3.75 mm. longa, lobis anguste deltoideo-ovatis 1.2 mm. longis antheris ramisque styli paulo superatis. *Achaenia* lineari-oblonga, glabra, costata, 2.75-3 mm. longa. *Pappus* albus, corollae tubum subaequans.

VENEZUELA. Merida: Paramo de Molina, Sierra Nevada, 4000 m., January 28th, 1939, J. Hanbury-Tracy 264. "Shrub 3-5 ft. high, in sheltered gullies in open paramo, in sparse thickets of scrub, grasses, etc. Flowers yellow."

This is presumably allied to *S. pachypus* Greenm., which was based on five different gatherings from the Merida region, one of the localities being the Paramo del Molino, which must not, according to Mr. Hanbury-Tracy, be confused with the Paramo de Molina. The writer is unable to assign Mr. Hanbury-Tracy's fine material to this species even as a variety, since *S. pachypus* is described as having stems tawny-pubescent with coarse stiff hairs; small leaves only 5-10 mm. long and 3-6 mm. broad, closely and regularly crenate-dentate, and abruptly contracted into a petiole only 1-2 mm. long; and involucre bracts only 4-5 mm. long. The only possible ally in Weddell's conspectus of the Andine Senecios is *S. subarachnoides* Wedd. from which *S. venezuelensis* differs in the absence of arachnoid tomentum, relatively broader and more coriaceous leaves with deeply impressed nerves on the upper surface, and broader involucre bracts.

**Senecio sancti-Sebastiani** sp. nov.; *S. subarachnoides* Wedd. affinis, sed tota planta indumento plerisque partibus persistente griseo-argenteo arachnoidae-lacciformi arcte induta, capitulis cum involucri ipsis fere dimidio minoribus late dense corymbosis, bracteis involucri paucioribus latioribus interioribus ovatis distinguitur.

*Herba* perennis fruticosa, ubique indumento supra descripto praedita, inferne ramosa; rami defoliati teretes 4-5 mm. diametro, ultimi floriferi ad 40 cm. longi, dense foliati, ramulos novellos foliatos foliis subaequilongos ex axillis gerentes. *Folia* oblanceolata, elliptico-oblonga vel obovato-elliptica, apice subacuta vel obtusa vel rotundata, basi in petiolum attenuato-cuneata, 2.5-5 cm. longa, 0.7-2.6 cm. lata (ea ramulorum novellorum minora), firme chartacea vel subcoriacea, indumento griseo-argenteo lacciformi subtus perconspicuo densissimo persistente supra nonnunquam laxiore et plus minusve deterisili, trientibus duobus superioribus argute serrata dentibus utroque margine 2-7, vel subintegra, costa supra canaliculato-impressa subtus praesertim secus dimidium inferius prominente, nervis supra impressis haud cernendis subtus impressis vel primariis nonnunquam prominulis his utroque costae latere 3-5 ascendentibus;

petiolus satis gracilis, supra canaliculatus, 0.9-1.8 cm. longus, indumento saepe conspicue laminatim deterili. *Inflorescentia* polycephala, arcte dense corymbosa, parte florente 2-4 cm. alta 4-7 cm. lata, ramis imis 2-7 cm. longis, ubique indumento supra descripto hic illic nonnunquam deterili oblecta; bracteae ramos subtendentes lineari-oblongae, imae ad 1.2 cm. longae, superne decrescentes. *Capitula* radiata, circiter 0.8-1 cm. alta, ligulis inclusis 1.5 cm. lata. *Involucrum* bracteis lineari-lanceolatis acutis 4 mm. longis vix ad 0.7 mm. latis calyculatum; bracteae involucri ipsius 13-14, exteriores oblongo-lanceolatae, interiores ovatae, acuminatae, acutae vel interiores obtusae, 5 mm. longae, 1.8 (exteriores)-2.75 mm. latae, concavae, interiores marginibus late scariosis superne ciliolatis, apice penicillato-lanatae, ceterum extra lana laxa arachnoidea hic illic deterili indutae. *Receptaculum* apice convexum, conspicue alveolatum, glabrum, inconspicue denticulatum. *Flores radii* circiter 13; tubus 3.5-4 mm. longus, inferne arachnoideo-pubescentis; ligula flava, 6 mm. longa, ad 2.7 mm. lata, apice brevissime obscure lobulata. *Flores disci* numerosi, 60-70; tubus ad 1.5 mm. longus; lamina tubuloso-infundibuliformis, 3.5-4 mm. longa, lobis deltoideo-ovatis ad 0.75 mm. longis, antheris styloque inclusis. *Achaenia* glabra, costata, circiter ad 1.75 mm. longa. *Pappus* albus, corollae tubum subaequans.

COLOMBIA. Sierra Nevada de Santa Marta: Surivaquito, open paramo, 3000 m., April 22nd, 1939, *J. Hanbury-Tracy* 355 (typus); mountains of San Sebastian, July, 1844, *Purdie*; San Sebastian, "6 à 7000", fl. Jan., *Funck* 505; "Sierra Nevada", Jan., 1917, *M. T. Dawe* 683, 714.

These five collections, all from the same district, represent a very distinct species which does not appear to have been recorded or described by Weddell, Greenman or other students of this genus.

## XII.—CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA: XLVI.

THE HAIARIBALLIS OF BRITISH GUIANA. N. Y. SANDWITH.

*Alexa leiopetala* sp. nov.; *A. imperatricis* (Schomb.) Baill. affinis, ramulis junioribus necnon rhachi folii praecipue foliolis subtus ubique minute adpresse pubescentibus, calyce minore, colore petalorum inferiorum, petalis omnibus extra glabris neque trientibus duobus inferioribus conspicue sericeo-pubescentibus, antheris brevioribus, ovarii stipite per totam longitudinem tomentoso differt.—*A. imperatricis* (Schomb.) Baker in Hook. Ic. Pl. t. 1794 (1888) quoad tab., partim quoad descr.

*Arbor* mediocris vel alta; ramuli hornotini minute arcte dense fulvo-pubescentes. *Folia* rhachi indumento simili minutissimo nonnunquam vix nisi sub lente forti cernendo vestita; petioluli

similiter induti, 6-10 mm. longi; foliola 9-13, oblonga vel oblongo-lanceolata, terminale nonnunquam obovato-ellipticum, apice conspicue anguste cuspidato-acuminata, basi rotundata vel obtusa et plus minusve cuneata, foliolulum terminale acute cuneatum, 5.5-20 cm. longa, 2.3-6.2 cm. lata, tenuiter coriacea, supra glabra, subtus dense arcte minutissime pubescentia indumento nunc obvio nunc oculum nudum eludente et sub lente forti tantum distinguendo, nervatione ei *A. imperatricis* subsimili sed reticulatione saepius minus prominula. *Racemi* infra folia e ramulis vetustis nudis exorientes, 5-10 cm. longi, densiflori, ubique indumento minuto subsericeo siccitate fusco-pullo arcte tomentosi; bractee tempore florendi persistentes, ovatae, acuminatae, concavae, ad 4 mm. longae, basi circiter 3 mm. latae: pedicelli inferiores ad 3 cm. longi, saepius plus minusve nutantes, superiores gradatim breviores. *Alabstra* matura ellipsoidea vel obovoideo-ellipsoidea, 1.2-1.5 cm. longa, 0.8-1.2 cm. diametro. *Calyx* campanulatus, irregulariter fissus atque lobatus, 1.3-1.8 cm. longus, apicem versus 1.5-2.5 cm. latus. *Petala* glabra, scarlatina, apice aurantiaca; vexillum obovatum, dimidio superiore conspicue reflexo, apice profunde late bilobum, 3.5 cm. longum, apicem versus circiter 3.2 cm. latum; petala cetera 4 elliptico-oblonga vel anguste obovato-oblonga, obtusa, 2.9-3 cm. longa, 0.75-1.2 cm. lata. *Stamina* glabra, filamentis scarlatinis 3-4 cm. longis, antheris aurantiacis 4-4.5 mm. longis. *Ovarium* fulvo-tomentosum, circiter 1.5 cm. longum, 3 mm. latum, stipite fulvo-tomentoso 7 mm. longo; stylus falcato-curvatus, circiter 1.5 cm. longus, basi excepta glaber; ovula 6. *Legumen* oblanceolatum, maturum fere ad 25 cm. longum, prope apicem ad 5.5 cm. latum, extra dense ferrugineo-tomentosum, intus spongiosum; semina nigra, circiter 2.5 cm. longa, ad 1.8 cm. lata.

BRITISH GUIANA. Mazaruni Station, in mixed forest on loose brown sand, fl. Jan. 12th, 1940, fr. April 12th, 1940, *Fanshawe in Forest Dept.* 3077 (typus); *ibid.*, in Greenheart-mixed forest heavily thinned out by fire, fl. Jan. 14th, 1933, *Davis in Forest Dept.* 2338; *ibid.*, fr. March 16th, 1909, *C. W. Anderson in Forest Dept.* 187; *ibid.*, fr. August 17th, 1934, *Archer* 2441. Tinamu Line, Lower Cuyuni River, in Wallaba forest on white sand, fr. 1931, *Davis in Forest Dept.* 1056. Makauria River, Essequibo River, fr. March 1909, *C. W. Anderson in Forest Dept.* 187 A. Pokorero Creek, Kamuni River, Demerara River, in swampy sand on creek bank, April 20th, 1923 (leaves only), *Hohenkerk in Forest Dept.* 187 B. Upper Demerara River, fl. September, 1887, *Jenman* 4240.

Field notes show that the tree varies from 88 to 122 ft. in height, and from 16 to 24 inches in diameter. Additional notes by Mr. Fanshawe are as follows: "Unbuttressed; leaves glossy above, dull brownish-green below; flowers cauliflorous, pedicels and calyx tomentose, ferrugineous in bud, flushed scarlet in flower; corolla waxen, scarlet, tipped orange, with 4 oblong petals, the standard broad, retuse, revolute; filaments scarlet, waxen; anthers



orange." Mr. Davis writes of the flowers as "orange-scarlet, with very dark reddish-brown calyx. The tree from below appears to have the branches covered with deep scarlet flowers."

Vernacular name (Arawak), *Haiariballi*.

Officers of the Forest Department of British Guiana have for some years considered that the Arawak name Haiariballi covers two quite distinct trees, *Alexa imperatricis* (Rob. Schomb.) Baill. and a close ally, with different distributions in the Colony. The first of these, identified correctly with Robert Schomburgk's *Alexandra imperatricis*, is very abundant and dominant in certain areas of mixed forest on the higher ground of the North-West District, in other words, in the north-western portion of the *Eschweilera Sagotiana* (Kakaralli)—*Licania venosa* (Kautaballi) association which is the more western of the two associations representing the climatic climax of the vegetation of the British Guiana penepain (see T. A. W. Davis, "Endemic trees of the British Guiana penepain", in Journ. Ecology, vol. 29, pp. 1-12 (1941)). It also occurs in the Pomeroon District, while Robert Schomburgk first discovered it far to the south-west on banks of the Wanamu River, which is a southern tributary of the Upper Cuyuni with its source in the Pakaraima Range. In the last locality, where Schomburgk camped at the end of 1842 or very early in January of 1843, the tree was known to the Arecuna and Macusi Indians as "Koa-toi". That it occurs elsewhere on the Pakaraima Range has been proved by its rediscovery by Pinkus (coll. no. 171), at 2,000 ft. on the upper Arubaru River, a tributary of the Kaku River, to the south-east of the Wanamu and on the north side of Mt. Roraima. This discovery is recorded in Bull. Torr. Club, lxvii, 287 (1940), with the additional collector's note that the bark of the tree is used as a fish-poison. The appearance in the Pakaraimas of a tree which is abundant in the North-West District is of interest because Davis, in his paper in the Journal of Ecology cited above (p. 11), is not of opinion that the Pakaraimas have contributed many species, still less species occurring in abundance, to the flora of the forests of the penepain, for which he postulates a very different origin.

Robert Schomburgk's figure and description of *Alexandra*—a name dedicated in a special dissertation to Alexandra Feodorowna, Tsarina of all the Russias, and preoccupied by *Alexandra* Bge. in the *Chenopodiaceae*—as well as his specimen in the Kew Herbarium leave no doubt of the identification of *Alexa imperatricis* with this tree, recent collections of which are as follows: Yarikita River, N.-W. District, foliage only, April 13th, 1929, *Forest Dept.* 916; Aruka River, N.-W. District, fr. July 6th, 1908, *C. W. Anderson* in *Forest Dept.* 11; Hosororo, Pomeroon District, fl. and fr. July 12th, 1934, *Archer* 2259 (noted as a fish-poison); *ibid.*, fl. July 29th, 1934, *Archer* 2411; Mairaka, Pomeroon River, fl. March 2nd, 1932, *Davis* in *Forest Dept.* 2276. Some idea of its abundance and

distribution may be gathered from Davis' paper on "Some Observations on the forests of the North West District", in Agric. Journ. Brit. Guiana, ii. 157-166 (1929). The first name combination under the substituted generic name *Alexa* Moq. was made by Baillon, Hist. Pl. ii. 362, in adnot. (1870), and not, as has been supposed, by Baker in Hook. Ic. Pl. t. 1794 (1888).

The second Haiariballi, which is described above, has not been found in the North-West or Pomeroon Districts, but is frequent in the drier climate of the Cuyuni-Mazaruni-Essequibo River region and occurs more rarely in that of the Demerara River (see Davis, Journ. Ecology, 1941, l. c. 8), where it was first collected by Richard Schomburgk whose record "Auf den Sandhills am Demerara", in Reisen in Britisch Guiana, iii. 1033 (1848), must refer to this species. In Richard Schomburgk's Reisen, ii. 488-489 (1848), and transl. Roth, ii. 390-391 (1923), we read that Schomburgk found isolated examples of the tree in April 1844, while travelling alone up the Demerara River, at a point on the western bank not far above Georgetown where there is a low chain of hills called "the Sandhills". This locality, described as above the mouths of the "Cammoni" and Madewini Rivers, cannot be far from the spot where Hohenkerk collected *A. leiopetala* on the Kamuni River in 1923. The tree was described as generally 100-110 ft. high, with brown pods mostly 18-20 in. long. Unfortunately, leaves and flowers of Richard Schomburgk's material are not represented at Kew. From the evidence of field-notes, this second Haiariballi has been found in the Wallaba (*Eperua*), Greenheart and Mixed forest consociations. Jenman's gathering on the Upper Demerara River in 1888 was unfortunately figured by Baker in Hooker's Icones as *Alexa imperatricis*, and Baker's description, except for the details of the height of the tree (90-120 ft.), the colour of the petals ("aurantiaca"), and the pod and seeds, all taken from Robert Schomburgk's account of *Alexandra imperatricis*, applies to *Alexa leiopetala*.

Herbarium study of the material available provides enough evidence for the definition of the two Haiariballis as distinct species. The leaflets of *A. leiopetala* are relatively shorter and narrower than those of *A. imperatricis* which may attain a length of 30 cm. and a breadth of 13 cm., and their acumen is longer, narrower and therefore usually far more noticeable. But the best distinguishing character in the foliage lies in the very minute pubescence on the lower surface of the leaflets of *A. leiopetala*, and found also on the petiolules, rhachis and branchlets. This is sometimes obvious, but is evanescent with age, and on some sheets (e.g., Jenman 4240) can be seen only under a lens of high power; but it is always present, whereas the leaflets of *A. imperatricis* are completely glabrous, and the rhachis and branchlets practically so. The inflorescences of the two species are very similar in general appearance, that of *A. leiopetala* being on a smaller scale with the bracts often persistent and evident, whereas the bracts of *A. imperatricis* fall early and have not been seen. The calyx of *A. imperatricis* is larger than that of its ally, and reaches

a length of 2.5 cm. The petals of *A. imperatricis* are sometimes, but not always, longer than those of *A. leiopetala* and, instead of being completely glabrous, are always densely and conspicuously subsericeous-pubescent on the lower two thirds (except for the glabrous margins) of the outer surface. As to their colour, from the evidence of field-notes and descriptions, it seems that the standard of both species is deep red, but that whereas in *A. imperatricis* the 4 lower petals are mainly orange-yellow, merging to deep red towards the base, in *A. leiopetala* the same petals are orange-scarlet or scarlet tipped with orange. Two other distinguishing characters have been discovered in the flowers: the anthers of *A. imperatricis* are longer than those of *A. leiopetala*, being 6.5-7.5 mm. long; and the stipe of the ovary is glabrous (as described by Schomburgk) in *A. imperatricis* except immediately below the ovary, whereas in *A. leiopetala* it is tomentose throughout its length. In spite of Schomburgk's delineation of a full ovary with 12 ovules, only 6 ovules, in the abaxial half, have been found in such ovaries of both species as have been dissected. Evidence from the fruits and seeds is not yet complete, since only two good pods and no seeds of *A. imperatricis* have been seen. One of these pods was sent to Kew from Berlin by Prof. Eichler in 1882 and was evidently collected by either Robert or Richard Schomburgk (if by the latter, it may be a pod of *A. leiopetala*); the other is from C. W. Anderson's collection from the Aruka River, N.-W. District, cited above. Both have dehisced and lost their seeds, and both are about 27 cm. long, with the same tomentum and about as broad as those of *A. leiopetala*; the gap left by one of the seeds in Schomburgk's pod is about 3.5 cm. long. Fragments of pods collected by Archer are not helpful. Robert Schomburgk described the pods of *A. imperatricis* as 18-20 inches long and  $2\frac{1}{2}$  inches broad, dimensions of length which were repeated by his brother when writing of *A. leiopetala* and which greatly exceed those of the available examples of both species. He described the seeds of *A. imperatricis* as chestnut-coloured and of the size of a chestnut,  $1\frac{1}{2}$  inches long,  $1\frac{1}{4}$  inches broad and  $\frac{1}{2}$  inch thick. If these characters are constant the seeds of *A. imperatricis* are larger than those of *A. leiopetala* and possibly of a different colour, since those of two collections of the latter species are black when dried.

These Haiariballis are both, so far as is known, endemic in British Guiana, but *A. imperatricis* probably occurs in Eastern Venezuela in forests near the Orinoco Delta: they are remarkably distinct from the three other known species of *Alexa*, *A. Wachenheimii* R. Benoist of French Guiana and Surinam, and *A. grandiflora* Ducke and *A. bauhiniiflora* Ducke of Amazonian Brazil, all of which bear white or whitish-yellow petals.

### XIII.—ADDITIONS TO THE FLORA OF BORNEO AND OTHER MALAY ISLANDS : XIX.\*

THE PENTAPHRAGMATACEAE OF THE OXFORD UNIVERSITY EXPEDITION TO SARAWAK, 1932. H. K. AIRY-SHAW.

#### I. DESCRIPTION OF FAMILY.

**Pentaphragmataceae** *Airy-Shaw*, fam. nov. *Flores* hermaproditii, actinomorphi. *Calycis* *tubus* ope septorum 4-5 longitudinalium cum staminibus continuorum ovario adnatus, foveis 4-5 profundis nectariferis petalis oppositis, campanulatus vel cylindricus; *lobi* 4-5, imbricati, membranacei, persistentes, inaequales, 2 majoribus cum 3 minoribus alternantibus. *Corolla* apice calycis tubi inserta, gamopetala (plerumque brevissime), plus minus campanulata, subcartilaginea, persistens, lobis 4-5 valvatis plerumque patentibus vel reflexis. *Stamina* 4-5, sepalis opposita, basi corollae adnata; filamenta persistentia; antherae oblongae, introrsae, basifixae, rimis dehiscentes. *Discus* o. *Ovarium* inferum, 2-loculare, placentis axilibus bifidis multiovulatis. *Stylus* crassus, brevis, simplex; stigma magnum, ovoideum vel oblongum, sulcatum. *Ovula* minutissima, numerosissima, pendula, anatropa, integumento unico, sacculo embryonali e micropyle longe exserto (teste *Poulsen*). *Fructus* baccatus, indehiscens. *Semina* numerosa, minuta, testa castanea incrassata reticulata. *Embryo* minutus, radicula juxta hilum sita; albumen copiosum.

*Herbae* perennes, basi plus minus lignosae, saepe radicanes, succosae, pilis multicellularibus ramosis vestitae. *Folia* alterna, ampla, simplicia, saepe asymmetrica, denticulata vel integra, subcarnosa, exstipulata. *Inflorescentiae* laxae vel dense scorpioideo-cymosae, axillares. *Bracteae* et *bracteolae* saepe amplae. *Flores* pedicellati vel sessiles, albi vel virides vel aurantiaci. (Syn.: *Campanulaceae*-*Campanuloidae*-*Pentaphragmeae* [sic] Schönl. in Engl. et Prantl, Nat. Pflanzenf. ed. 1, IV. 5, 40, 68 (1889); *Saxifragaceae* "sect. *Francfleuriae*" [sic] Chev. et Gagnep. in Rev. Bot. Appl. 7, 663: 1927; "Pentaphragmacées" Gagnep. l. c. 8, 622: 1928, in adnot., nom. provis.)

Genus unicum: **Pentaphragma** Wall. ex G. Don, Gen. Syst. 3, 731 (1834). (Syn.: *Francfleuria* Chev. et Gagnep. in Rev. Bot. Appl. 7, 663: 1927.)

Species typica: *P. begoniifolium* (Roxb. ex Jack) Wall. Cat. 1313 (1829) (*Phyteuma begoniifolium* Roxb. ex Jack in Mal. Misc. 1, 5: 1820).

Species (including a few undescribed) about 25,† from Burma to New Guinea. Lower Burma 1, Siam and Indo-China 7, Kwangtung 1, Malay Peninsula 4, Lingga Archip. 2, Sumatra 3, Banka 1, Anamba

\* Continued from K.B. 1940, 262.

† Diels in Engler, Syllabus Pfl.-Fam. ed. 11, 366 (1936), gives the number of species as 4!

Is. 1, Borneo 8, Philippines 5, Moluccas 1, New Guinea 1. Almost all endemic and local, except *P. begoniifolium* (Roxb. ex Jack) Wall., Lower Burma, Peninsular Siam, Northern Federated Malay States; *P. ellipticum* Poulsen (*P. Ridleyi* King et Gamble), Southern F.M.S. and Banka; *P. grande* Ridl., Pahang and Sarawak; *P. Scortechinii* King et Gamble, Peninsular Siam, F.M.S., Sumatra, Anamba Is.

Almost every author who has dealt with *Pentaphragma* has admitted its highly anomalous position in the *Campanulaceae*, and it is therefore surprising that it has not been removed earlier. It shows, however, so many possible links with other families, besides possessing so many unique features of its own, that it is at present scarcely possible to suggest a satisfactory place for it in any recognized system.

The habit and foliage suggest certain *Begoniaceae*, *Rubiaceae* (*Argostemma*, etc.) and *Gesneriaceae* (*Epithema*, etc.). The succulence of the stem and leaves recalls the *Cucurbitaceae*. The scorpioidally cymose inflorescence is very similar to that of many *Hydrophyllaceae* and *Boraginaceae*. According to Chevalier and Gagnepain, l. c. 662, and op. cit. 8, 622 (1928), the "*pente phragmata*" connecting the calyx-tube with the ovary constitute a character of frequent occurrence in the *Melastomataceae*, but these authors cite no examples, and I know of none. The indumentum of branched multicellular hairs recalls that of the *Solanaceae*.

The large, unequal, persistent calyx-lobes, the subcartilagineous persistent corolla with valvate lobes, the five stamens with persistent filaments, and the short style and massive stigma, are also unusual characters, peculiar enough in themselves: taken together, in conjunction with those mentioned above, they form a combination sufficiently remarkable to characterize a very distinct family.

Chevalier and Gagnepain in 1927 described certain Indo-Chinese species under the generic name *Francfleurya*, referring the genus to the *Saxifragaceae*, but the following year Gagnepain discovered the mistake, having overlooked *Pentaphragma*. Although the latter author speaks of "l'aspect général qui rappelle celui des *Saxifraga* de la section *Bergenia*; l'ensemble des caractères qui correspond bien à la famille des Saxifragacées," I have been unable to find any convincing evidence of Saxifragaceous affinity.

Hans Hallier, who could usually be trusted to spot an anomalous genus, leaves *Pentaphragma* in *Campanulaceae*, merely pointing out the similar scorpioidally cymose inflorescences in *Boraginaceae* and certain *Convolvulaceae*\* (*Jacquemontia*) and *Loasaceae* (*Kissenia*) (H. Hallier, "Ueber *Juliania*", etc., in Beih. Bot. Centralbl. 23 (2), 127, 132: 1908). In Hallier's system (l. c. 176-198), which in spite of some startling and obvious defects deserves very careful consideration, *Pentaphragmataceae* would fall either in "*Peponisferen*" (p. 187), "*Tubifloren*" (p. 195) or "*Campanulinen*" (p. 197).

\* Cf. also *Mina*, *Cardiopteris* (Beccari in Nuov. Giorn. Bot. Ital. 9, 106: 1877), *Cuscuta*.

Dr. C. R. Metcalfe has been good enough to examine the anatomy of representative species of the genus. The main points in his report are the following :—

“ 1. The stomata are surrounded by an inner ring of 3 or sometimes 4 subsidiary cells, whilst around these there is an outer but less distinct ring of subsidiary cells. This arrangement is not common amongst the Dicotyledons as a whole, but it occurs in, and is particularly characteristic of, the *Begoniaceae*.

“ 2. The vessels are provided with scalariform thickening of the type which occurs throughout all the examined members of the *Begoniaceae*. This again is a very rare character amongst the Dicotyledons . . . . Scalariform *thickening* is far less common amongst the Dicotyledons even than scalariform *perforations*.

“ 3. There is nothing about the general structure of the petiole or of the stem which is inconsistent with the suggestion that the plant may belong to the *Begoniaceae*. On the other hand none of these characters support the inclusion of *Pentaphragma* in the *Solanaceae*, *Campanulaceae* or *Lobeliaceae*.”

No suggestion that *Pentaphragma* actually belongs to the *Begoniaceae* is, of course, here made. Morphologically it has little in common with that family beyond the habit, succulence and asymmetrical leaves. This makes the extraordinary agreement in important anatomical details all the more remarkable. For the present it seems probable that the question of the true affinity of this family must be left open. For a fairly detailed (but inconclusive) discussion of the anatomy of *Pentaphragma*, with a few remarks on relationships, the reader is referred to the article by V. A. Poulsen in Vidensk. Meddel. Naturh. Foren. Kjöbenh., 1903.

## II. ENUMERATION OF SPECIMENS.

***Pentaphragma grande* Ridley** in Journ. Linn. Soc. 38, 312 (1908); Fl. Mal. Penins. 2, 203 (1923).

Dulit Ridge, growing on moss-covered ground in moss forest, very damp, c. 1290 m., 5 Sept., Syngé 400: “Herb, c. 3'. Stem thick. Leaves large, slightly fleshy, prominently veined, light green. Flowers white, tubular. Petals green at base.”

This very distinct species has hitherto been known only from Gunong Tahan, Pahang, the type locality. The Bornean specimens agree well with the type collection of Robinson and Wray. The few-flowered inflorescences and the unusually thick and fleshy consistency of the sessile flowers immediately distinguish it from the other large-flowered species such as *P. philippinense* Merr., *P. albiflorum* H. H. W. Pears., *P. grandiflorum* Kurz, *P. macrophyllum* Oliv., etc.

*Pentaphragma albiflorum* H. H. W. Pearson in Hook. Ic. Pl. ser. 4, 8, t. 2706 (1901); Merrill in Sar. Mus. Journ. 3, 556 (1928).

Dulit Ridge, "transition" forest, c. 1200 m., 9 Sept., *Native Collector* 1650: "Leaves thick and sappy. Calyx greenish white, corolla pale yellow."

The flowers are rather larger than in the type, and the anthers have no trace of the two apical cusps shown in the plate in Hooker's *Icones*, but the specimens otherwise agree well.

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#### XIV. MISCELLANEOUS NOTES.

SIR ARTHUR WILLIAM HILL.—Shortly before this number of the Bulletin went to press, the Royal Botanic Gardens sustained a grievous loss in the death of the Director, Sir Arthur William Hill, K.C.M.G., Sc.D., D.Sc.(Adelaide), F.R.S., who was killed in a riding accident on November 3rd, 1941.

Sir Arthur had been officially connected with Kew for thirty-four years, for the first fifteen as Assistant Director. He succeeded Sir David Prain as Director in 1922, and his long service at Kew will always be a landmark in the history of the establishment. He had travelled widely, and was personally known to botanists in all parts of the world. To these, and especially to botanists in various parts of our overseas Empire, his death must bring a great sense of personal loss.

It is hoped to publish a full account of Sir Arthur's life in the next number of the Kew Bulletin.

SIR GEOFFREY EVANS, C.I.E., M.A., has been appointed Acting Director by the Ministry of Agriculture and Fisheries.

LEONARD ALFRED BOODLE.—We mourn the death on August 22nd, 1941, of L. A. Boodle, who was a member of the Kew Staff for nearly 26 years, being first an Assistant, and then for 21 years Assistant Keeper of the Jodrell Laboratory. He was appointed Assistant in the Laboratory on 1st October, 1904, but for six years before that time he had acted as Private Assistant to Dr. D. H. Scott, F.R.S., who was Honorary Keeper of the Jodrell Laboratory from 1892 to 1906 (*see* Kew Bulletin, 1892, p. 248, and 1906, p. 383). On the retirement of Dr. Scott, Mr. Boodle took charge of the Laboratory, and he was appointed Assistant Keeper on 5th February, 1909, retiring on 3rd May, 1930, on reaching the age limit (Kew Bulletin, 1930, p. 328).

He was educated at King's College School and at the Royal College of Science, graduating A.R.C.S., and was for seven years Demonstrator in Botany at the College under Dr. Scott. Before coming to Kew he worked on Marine Algae and spent some time in South Africa. His Algae work was done with the late Dr. George Murray at the Natural History Museum, and the genus *Boodlea* (*Siphoneae*) was named after him.

His association with Dr. Scott turned his interests towards plant anatomy, and he published several papers on the subject jointly with him. Later he embarked with Professor F. E. Fritsch on the translation of Solereder's great work on the Anatomy of Dicotyledons, but with his meticulous care over small details, and his difficulty in selecting the exact equivalents in English for the German, he did not complete his share of the work, and it was finished by Professor Fritsch alone.

Boodle's knowledge of Botany and botanical literature was remarkable, and he was a critic of rare value both of his own and of his fellow botanists' work. So keenly developed was his critical outlook that he rarely expressed his results in print, and much of the excellent work he did has never been published. His diffidence of his own powers also, unfortunately, prevented him from reading papers, or giving lectures before scientific societies, except on one or two occasions, so that he was well-known only to botanists working in his own line of study, by whom his wide knowledge and critical ability was often sought and highly appreciated.

His series of papers on the vascular structure of the Pteridophyta will always remain a monument to his careful work and painstaking attention to detail. Professor E. J. Salisbury writes: "He was a man for whose profound anatomical knowledge and surefootedness we all had the greatest respect. His extreme modesty and retiring nature led to many not appreciating to the full his great gifts."

Highly strung, gentle, unselfish and outstandingly generous, Boodle was well-known to only a few intimate friends. They, however, found him a valued friend, with a keen sense of humour, which found expression in various ways; thus, he wrote clever parodies of certain well-known papers in the Annals of Botany. These were circulated among his friends, but he was, unfortunately, always careful to destroy them. He was keenly interested in the fine arts, especially music and painting, and was a good critic. He was a devout member of the Church of England. He married in 1912 a Swiss lady, Mrs. Emery, and we offer our sincere sympathy to her in her bereavement.

A. W. H.

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List of papers published by Mr. L. A. Boodle:—

(With A. Calvert) On Laticiferous Tissue in the pith of *Manihot Glaziovii* and on the presence of Nuclei in this Tissue. Ann. Bot., 1887, 1, 1-8, 1 pl.

On some points in the Anatomy of the Ophioglossaceae. Ann. Bot., 1899, 13, 377-394, 1 pl.

Stem Structure in the Schizaeaceae, Gleicheniaceae, and Hymenophyllaceae. Ann. Bot., 1899, 13, 624-625.

On the Structure of the Stem in two species of *Lycopodium*. Ann. Bot., 1900, 14, 315-317.



Comparative Anatomy of the Hymenophyllaceae, Schizaeaceae and Gleicheniaceae. I. On the Anatomy of the Hymenophyllaceae. Ann. Bot., 1900, 14, 455-496, 3 pls.

II. On the Anatomy of the Schizaeaceae. Ann. Bot., 1901, 15, 359-419, 3 pls.

III. On the Anatomy of the Gleicheniaceae. Ann. Bot., 1901, 15, 703-747, 2 pls.

On an anomalous leaf of *Anemia hirsuta* Sw. Ann. Bot., 1901, 15, 765-766.

On Lignification of the Phloem of *Helianthus annuus*. Ann. Bot., 1902, 16, 1-4.

IV. Further Observations on *Schizaea*. Ann. Bot., 1903, 17, 511-537.

On Descriptions of Vascular Structures. New Phyt., 2, 1903, 107-112.

Succulent Leaves in the Wallflower (*Cheiranthus Cheiri* L.). New Phyt., 1904, 3, 39-46.

Secondary Tracheids in *Psilotum*. New Phyt., 1904, 3, 48-49.

The Structure of the Leaves of the Bracken (*Pteris aquilina* Linn.) in relation to Environment. Journ. Linn. Soc. Bot., 1904, 35, 659-669.

On the Occurrence of Secondary Xylem in *Psilotum*. Ann. Bot., 1904, 18, 504-517, 1 pl.

The Monoecism of *Fumaria hygrometrica* Sibth. Ann. Bot., 1906, 20, 293-299.

Lignification of Phloem in *Helianthus*. Ann. Bot., 1906, 20, 319-321.

N'Hangellite and Coorongite. Kew Bull., 1907, 145-151.

Report on defective oak spoke. Kew Bull., 1908, 135.

Raffia fibre from Madagascar. Kew Bull., 1908, 207-208.

Report on yield of Rubber from two tubers of *Raphionacme utilis*. Kew Bull., 1908, 306, 307.

On the production of Dwarf Male Prothalli in Sporangia of *Todea*. Ann. Bot., 1908, 22, 231-243.

On the Occurrence of Different Types of Hair in the Wallflower. Ann. Bot., 1908, 22, 714-716.

(With W. E. Hiley) On the Vascular Structure of some species of *Gleichenia*. Ann. Bot., 1909, 23, 419-432, 1 pl.

Mummy-coffin wood. Kew Bull., 1909, 74-76.

(With O. Stapf) *Peglera* and *Nectaropetalum*. Kew Bull., 1909, 188-191.

Padi. Kew Bull., 1909, 277-279.

(With T. A. Sprague) Kokoti (*Anopyxis ealaënsis* Sprague). Kew Bull., 1909, 309-312.

Remedies for snake-bite. Kew Bull., 1909, 343-345.

Galls on an Indian Grass. Kew Bull., 1910, 69-73.

(With W. Dallimore) Report on investigations made regarding "Beech Coccus" (*Cryptococcus fagi* Bärensprung). Kew Bull., 1911, 332-343.

(With W. B. Turrill) A Hybrid Heath. Kew Bull., 1911, 378-379.

The Root and Haustorium of *Buttonia natalensis*. Kew Bull., 1913, 240-242.

On the Trifoliate and other Leaves of the Gorse (*Ulex europaeus* L.). Ann. Bot., 1914, 28, 527-530.

Cold storage of fruit and vegetables. Kew Bull., 1914, 11-16.

(With T. A. Sprague) West Indian Boxwood. Kew Bull., 1914, 214-219.

The Ringing of Trees. Kew Bull., 1914, 222-225.

Concrescent and Solitary foliage leaves in *Pinus*. New Phyt., 1915, 14, 19-22.

Abnormal Phyllotaxy in the Ash. Ann. Bot., 1915, 29, 307-308.

*Thyrsopteris elegans*. Kew Bull., 1915, 295, 296, 1 pl.

A Method of Macerating Fibres. Kew Bull., 1916, 108-110.

The Exhalation of Scent by the Flowers of *Michelia fuscata*. Kew Bull., 1916, 185-188.

The Preservation of Leafy Twigs of the Beech. Kew Bull., 1917, 229-231.

The Nature of Charred Wood. Kew Bull., 1917, 306-308.

The Introduction of Spruce Fir into Britain. Kew Bull., 1917, 336-339.

The Mode of Origin and the Vascular Supply of the Adventitious Leaves of *Cyclamen*. Ann. Bot., 1920, 34, 431-437.

(With W. Dallimore) Bamboos and Boring Beetles. Kew Bull., 1920, 282-285.

Ravison as a Commercial Term. Kew Bull., 1921, 115-117.

Mistletoe on Lime Trees. Kew Bull., 1921, 212-215.

The Bacterial Nodules of the Rubiaceae. Kew Bull., 1923, 346-348.

Mistletoe on Oaks. Kew Bull., 1924, 331-333.

(With Sir A. W. Hill) *Typhonodorum Lindleyanum*: the Development of the Embryo and Germination of the Seed. Ann. Bot., 1929, 43, 437-450, 1 pl.

CHARLES HENRY WRIGHT.—We record with deep regret the death of Mr. C. H. Wright which occurred at his home at Seaton, Devon, on June 21, 1941. Mr. Wright was a member of the Herbarium Staff for 45 years and was therefore well-known to a wide circle of botanists. He was born at Oxford on June 5, 1864, and was educated at New College School, and received his early training in botany at the Herbarium and Laboratory of the Oxford Botanic Garden. He was appointed an Assistant in the Herbarium at Kew in 1884. His care and accuracy were soon noted by the authorities, and the task of checking the manuscripts and reading the proofs of the great Kew floras—"Flora Capensis" and "Flora of Tropical Africa"—was after a time allotted to him by Sir William Thiselton-Dyer, and in 1899 he became sub-editor. On Dr. W. B. Hemsley's retirement from the Keepership in 1908 he was appointed Assistant Keeper in succession to Dr. Stapf.

Wright's special groups were the *Bryophyta* and the *Pteridophyta*, and amongst Flowering Plants he had charge of the Petaloid Monocotyledons and Palms. His most important work from the Herbarium point of view was probably that which he did on the Ferns and on the families *Liliaceae* and *Amaryllidaceae*. Notwithstanding his many other duties he found time to elaborate many families for the Floras, particularly *Boraginaceae*, *Solanaceae*, *Proteaceae* (with J. G. Baker), and *Palmae* in the "Flora of Tropical Africa", and the *Solanaceae*, *Boraginaceae*, *Chenopodiaceae*, *Polygonaceae* and *Thymelaeaceae* in the "Flora Capensis".

He also wrote several papers and monographic studies which were published in the Linnean Society's Journal or elsewhere. The details with regard to the receipt of all specimens were for many years in his hands, so that he had an unrivalled knowledge of the history of the Kew Collections. Another charge in which he took special interest was the very extensive collection of drawings and photographs of plants which is maintained in the Herbarium.

After his retirement under the age-limit in August, 1929, Wright settled with his family at Seaton, and characteristically threw himself at once into local social and church affairs and into the study of the local flora. He was enthusiastic in assisting in the production of the new and excellent "Flora of Devon" which was published in 1939 under the auspices of the Devonshire Association.

Wright became an Associate of the Linnean Society by election as a young man of 32, an honour which he greatly appreciated, and he persistently refused to allow his name to be put forward for the Fellowship. He followed J. G. Baker as lecturer to the student gardeners in Systematic Botany, a duty he continued to carry out until he retired. Wright, who served under four Directors and five Keepers of the Herbarium, will always be remembered for his meticulous care in those lines of work in which he was especially interested, and for his genial manner and the friendly hand which he extended to the new and younger members of the Staff.

A. D. C.

EDWARD BARNES.—With great regret we record the death in Madras on the 31st May, 1941, of Professor Edward Barnes, from pneumonia supervening on malaria, at the early age of 49. Though a Professor of Chemistry at the Madras Christian College, Barnes developed a great taste for botany, and of late years he took every opportunity for studying and collecting the plants of South India and devoted most of his holiday time to botanical excursions in the South Indian hills. He paid particular attention to the genera *Arisaema*, *Impatiens* and *Sonerilla*. His specimens were always good, frequently including material in formalin, and sometimes accompanied by useful notes and sketches. He had the knack of inducing the specimens to retain their natural colours to a remarkable degree. Many of the plants collected by him were new; and all

these were described, some by himself, and published in the Bulletin or in the *Icones Plantarum*.

While on furlough he worked for some time in the Herbarium on the specimens he had brought home.

C. E. C. F.

**The Garden Clinic.\***—Of popular works for the amateur gardener there is no end. The present book strikes a new note in a series of line drawings, arranged in double-page plates, which demonstrate pictorially the cultivation of various popular flowering plants and the treatment of some of their pests. As the book is written for American gardeners, some of the popular names of plants are unfamiliar, and some of the pests, notably insects, do not occur here. The general principles, however, appear to be sound, and the directions given are clear and not overburdened with technical detail. The illustrations are somewhat diagrammatic and at times amusing.

The various chapters deal in turn with annuals and perennials, Irises, Lilies, Roses, bulbous plants, evergreens, flowering trees and shrubs, hedges, climbers and waterlilies. There are brief notes as to culture, and mention of the chief diseases and pests which may attack these plants. Both plants and pests are for the most part referred to by their common names. A chapter on the treatment of cut flowers completes the work and an index is provided. The book should prove useful to beginners, especially when they can once more turn their attention from vegetables to flowers.

E. M. W.

**The Lily Year-Book.†**—In spite of the adverse conditions during 1940 the Royal Horticultural Society has published another Number of its Lily Year-Book. Amongst scientific articles there are three concerning the breeding and hybridising of lilies, and a short but valuable account by D. E. Green and M. A. H. Tincker on Mosaic in the two important commercial Lilies *L. auratum* and *L. speciosum*. Short articles of practical importance, accounts of several gardens where lilies are grown, and a miscellaneous series of notes make up the balance of an interesting and readable Number.

**British Trees.**—We have received a copy of a new edition of Step's "Wayside and Woodland Trees"‡ which has been revised and brought up-to-date. In addition to the numerous colour and half-tone plates which illustrate the volume, a useful section providing keys and illustrations of the leaf and winter-bud characters of the different species has been added.

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\* By Laurence Blair. Macmillan & Co., Ltd., 1940, pp. xii + 146, numerous black and white illustrations. Price 8s. 6d.

† "Lily Year-Book, No. 9, 1940." Royal Horticultural Society, London, 1940, pp. 96, 26 figs. Price 5s. paper, 6s. cloth.

‡ "Wayside and Woodland Trees." A guide to the British Sylva, by E. Step. Revised by A. Keith Jackson and A. Bruce Jackson, 1940. 186 pp., 24 colour plates, 151 half-tone plates, 58 text figs. Published by Frederick Warne & Co., Ltd., London and New York. Price, 10s. 6d.

**Botanical Magazine.**—Part iii of Vol. clxiii was published on June 3rd, in place of Part ii, the text and coloured plates of which were unfortunately destroyed by enemy action. Part ii should be published shortly.

Part iii contains the following illustrations:—*Kalanchoe Schimperi* A. Richard (t. 9623) from Abyssinia and S.W. Arabia; *Rhododendron parvulatum* Cowan (t. 9624) from South-eastern Tibet; *Fritillaria Drenovskii* Degen and Stojanoff (t. 9625), a native of the S.W. Rodope Massif and E. Macedonia; *Adenophora coelestis* Diels (t. 9626) from N.W. Yunnan; *Peddicca africana* Harvey (t. 9627) from Eastern South Africa to the E. Transvaal; *Iris innominata* L. F. Henderson (t. 9628), a native of the Rogue River valley, Oregon; *Gaultheria Miqueliana* Takeda (t. 9629), a Japanese species; *Lathyrus splendens* Kellogg (t. 9630), a native of San Diego County and Lower California; *Bulbophyllum leopardinum* (Wallich) Lindley (t. 9631) from Nepal, Sikkim and Assam; *Richea scoparia* Hook. f. (t. 9632) from Tasmania, allied to *R. Gunnii*, re-examination of which reveals two distinct species, one from Tasmania, the other from the mainland, which have been named *R. angustifolia* B. L. Burt and *R. continentis* B. L. Burt respectively. The final plate is of *Beloperone guttata* Brandege (t. 9633) from Mexico. Under this a new combination, *B. fulvicoma* (Schlecht.) A. W. Hill, has been made.

**Agriculture in Uganda.\***—A detailed account is given of the crops grown in Uganda and particular attention is paid to the two most important export crops, viz., coffee and cotton. The diseases and pests attacking these crops are also described fully. Of particular interest, and especially because investigators in other countries find the information difficult to procure, are the chapters dealing with the topography, soils and native methods of agriculture. Full accounts are also given of the history and organization of special sections of the agricultural department, such as the Botanic Gardens at Entebbe, which owed much in the early days to importations from Kew. It will be interesting, after the lapse of a decade or so, to compare the condition of native agriculture then with the situation that is so carefully and accurately portrayed in the chapters written by the various District Agricultural Officers. For instance, will the efforts of the Department succeed in checking soil erosion, and will a system of rational farming on a rotation basis be established in place of the existing methods which are largely based on shifting cultivation?

The book is a valuable record of agriculture as it exists today in Uganda and of the measures that are being taken to effect its improvement.

G. E.

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\* *Agriculture in Uganda*, by the Staff of the Department of Agriculture. Edited by J. D. Tothill, D.Sc. 551 pp., 30 plates. Oxford University Press, Oxford, Price 20s. net.

**Botanical Laboratory Technique.\*** — In well-established botanical laboratories it is usual to find that either the chief attendant or some other member of the staff keeps a book or index of what may be termed botanical prescriptions. These much-valued compendiums, built up from years of practical experience, contain directions for preparing stains, chemical reagents, culture solutions and so forth. They often include extracts from tables of physical constants together with various particulars of the type which is usually to be found at the beginning of the more technical type of pocket diary. The information in these notebooks and indexes is as essential to the botanist as is the accumulated culinary wisdom of Mrs. Beeton and other authorities to the housewife.

The compilers of "Plant Science Formulae" have now collected a selection of all of these different kinds of information in a single small volume. A book of this kind should be welcomed with open arms by all laboratory workers, and especially by those in new laboratories without much traditional knowledge of practical technique. It is true that some aspects of the subject have already been treated in rather more detail in well-known books on chemistry and botanical microtechnique, but the reviewer is not aware of any previous work which covers so wide a range of subjects in so small a space.

It is impossible to give a complete account of the contents of the book in a short review, but some indication of its scope may be indicated by saying that it includes directions for preparing most of the stains, reagents, culture solutions, solid nutrient media, solutions for volumetric analysis, etc., which are in everyday use in a botanical laboratory. Physical constants, workshop recipes and directions for preparing museum specimens are also included, together with the names and addresses of firms who supply botanical equipment.

That the book is incomplete is fully recognised by the authors, who have left blank pages at intervals for the insertion of additional or improved recipes. In this connection it may be mentioned that Boodle's admirable method for macerating commercial fibres (Kew Bull., 1916, p. 108) would be a useful addition. Also the little-known but valuable practice of impregnating bundles of fibres with glycerine gum to enable freehand sections to be cut for quick microscopical examination might well be included. Kisser's procedure (Cytologia, 1931, 2, 283-289) for making preparations of the leaf epidermis with sulphuric acid, and the methods which have been used on the Continent and in Japan for preparing spodograms (Botanical Review, 1940, 6, 204) are not as familiar as is desirable, and might well be brought to light in a book of this kind. Then, again, the use of hydrofluoric acid for softening hard materials such

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\* "Plant Science Formulae," by R. C. McLean, M.A., D.Sc., F.L.S., and W. R. Ivimey Cook, B.Sc., Ph.D., F.L.S. London, Macmillan & Co., Ltd., 1941, pp. vi + 203. Price 7s. 6d. net.

as wood before cutting sections of them is not mentioned. Sections of particularly difficult material such as palm trunks can be prepared only by special methods such as the one devised by Kaul (*Current Science*, 1935, 4, 99-102) which has given particularly successful results. Instructions for reviving dried herbarium and museum specimens so that they can be examined microscopically would also be useful. If these and other omissions, which will doubtless become apparent, could be made good in future editions, the value of the book would be still further increased. It would also be easier to use the book if the items in each section could be arranged in alphabetical order. The occasional cross references, given in cases where a reagent is mentioned on more than one page, are incorrect. This fact is realised by the publishers who propose to insert an erratum slip to this effect. The main index is, however, in order apart from a few omissions.

There is also room for improvement in the title of the book, which does not at present clearly indicate the nature of its contents. The word "formula" has been used in several different senses both in scientific circles and elsewhere, so that its present significance is not at once apparent. And why is it necessary to speak of "plant science" when the well-established word "botany" is available?

These suggestions are intended to be constructive. They do not belittle the book, which it is hoped will be very widely used in botanical laboratories.

C. R. M.

**Vegetable Gardening in Malaya.\***—This book deals with the production of vegetables in the wet tropics, and although it is naturally concerned with Malaya, yet its contents are readily applicable to other regions with similar climates. The senior author has already been associated with two previous publications on the same subject and has brought over twenty years experience to bear in the present issue. Unlike most of the other books on gardening in the tropics, this volume confines itself solely to vegetable production, and there is therefore ample space to deal with the problems involved from all angles. We thus find chapters dealing with the soils, which incidentally are admitted to be, for the most part, poor, the methods of cultivation, irrigation and the preparation of composts and the use of fertilisers. An all too short chapter is devoted to vegetable growing in the hills, which in the tropics presents unusual aspects owing to the excessive rainfall, high humidity and relatively low temperature. A method of raising vegetables of European origin under specially designed frames is of particular interest. The economics of vegetable growing is also discussed. This is a subject of particular importance at the present time, as

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\* By J. N. Milsum and D. H. Grist, pp. 206. Published by the Department of Agriculture, Straits Settlements and Federated Malay States, Kuala Lumpur. Price \$2.

Malaya has always been a large importing country and the lack of shipping and the need to be self-supporting during wartime is therefore an urgent necessity. Another novel feature deals with the nutritional value of the various groups of vegetables. A description of the more usual types grown is given, with illustrations. It is obvious how much the inhabitants of Malaya are still dependent on the skill and industry of the Chinese immigrants who have flocked into the country in the past. The book is commended to the attention of all interested in vegetable production in the tropics.

G. E.

**A Revision of *Melanconis*, Etc.\***—Since the publication of his "Monograph of the genus *Diaporthe*" (see Kew Bull. 1934, p. 224) Dr. Wehmeyer has continued his careful studies of stromatic fungi allied to *Diaporthe*. He considers that the loose arrangement of asci and the broad, band-like evanescent paraphyses in *Melanconis* and *Pseudovalsa* indicate relationship with the *Diaporthe* group, and has now published the result of his work on species described under the generic names *Melanconis*, *Pseudovalsa* and *Calospora*. The author recognises the four genera mentioned in the title of the book. The genus *Calospora* is rejected, *Calospora* Sacc. (1883) being a synonym of *Prosthecium* Fres. (1852) emend. Wehmeyer, and the earlier *Calospora* Nit. in Fuck. Symb. Myc. (1869) a synonym of *Melanconis* Tul. (1863). In an appendix, however, Dr. Wehmeyer discusses all species which have been described under *Calospora*, and also species of *Massaria* and *Aglaospora* which have been described as *Pseudovalsa*.

After an introduction giving brief historical notes as to genera, a discussion of relationships, and some account of the distribution of species, there follows a key to all genera included in the *Diaportheae*. Species of the four genera mentioned in the title are then described in detail, and illustrated by careful drawings of perithecia, asci and spores.

As in the previous work, the typography is excellent, and both author and publisher are to be congratulated on the production of these valuable monographs.

E. M. W.

### **Index to Horticultural Abstracts, Volumes I-X., 1931-40.†**

The appearance of an index to the first ten volumes of Horticultural Abstracts, compiled by D. Akenhead, Deputy Director of the Imperial Bureau of Horticulture and Plantation Crops, East Malling, is noted with interest. The compilation which consists of both subject and author indexes will be welcomed by all subscribers to this periodical.

\* A Revision of *Melanconis*, *Pseudovalsa*, *Prosthecium* and *Titania*, by L. E. Wehmeyer, University of Michigan, Scientific Studies, Vol. XIV. University of Michigan Press, Ann Arbor, Michigan, U.S.A., 1941, pp. viii and 161, 11 uncoloured plates. Price \$2.50.

† Published by the Imperial Bureau of Horticulture and Plantation Crops, East Malling, Kent, 1941. Copies obtainable on application to Central Sales Branch, Imperial Agricultural Bureaux, Agricultural Research Building, Penglais, Aberystwyth, Wales. Price 25s.



Kew BULLETIN.—The Editor will be glad to hear from persons or institutions having copies of the Kew Bulletin which they no longer require. After the war there will be a great need to help scientific institutions in many countries to restore their damaged or depleted libraries. The Editor is, therefore, anxious to obtain all available copies in order that the most effective use may be made of them at the conclusion of hostilities.

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